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# ENVIRONMENTAL IMPACT STATEMENT
for the
JIM BRIDGER THERMAL-ELECTRIC
GENERATION PROJECT

UNITED STATES
DEPARTMENT OF THE INTERIOR

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Submitted September 30, 1971

Daniel P. Baker
State Director, Wyoming

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SUMMARY

ENVIRONMENTAL IMPACT STATEMENT
(X)DRAFT ( )FINAL

Prepared by: U. S. Department of the Interior, Bureau of Land Management, Wyoming State Office

1. Jim Bridger Thermal-Electric Complex

   (X)Administrative Action ( )Legislative Action

2. The production portion of the complex, including a 1500 MW coal-fired steam electric plant, a strip mine nearby, a 42-mile long water delivery system, and rail and highway access, is situated in central Sweetwater County in southwest Wyoming. The distribution system includes three 345 KV transmission lines connecting the plant with substations in Bingham and Bannock Counties in eastern Idaho, about 235 miles to the west. The plant is presently under construction on private lands northeast of Rock Springs, Wyoming.

   In Wyoming, more than half of the land involved in the project is administered by the Bureau of Land Management. Federal grants or use permits in the form of rights-of-way are necessary before powerline construction can proceed. Pursuant to Section 102(2)(c) of the National Environmental Policy Act, this report is submitted prior to issuing any further rights-of-way for this project. (Two rights-of-way, one for a 7-mile spur line railroad, the other for a short 34.5 KV powerline were issued previously by the Bureau of Land Management after an analysis indicated there were no significant environmental impacts involved.)

3. Environmental impacts identified for the complex include: (a) effects of stack emissions on air quality and rangeland ecology, (b) erosion caused by disturbing native vegetation in construction, (c) disturbance of wildlife by increased traffic and furnishing access to remote areas along powerline route, and (d) the impact of the construction force and the permanent employees on community growth.

4. Alternatives considered involve alternative plant and powerline locations and alternative sources of power.

5. Comments requested from:

   Federal:
   - Department of Agriculture
     - Forest Service
     - Soil Conservation Service
     - Rural Electrification Administration
   - Department of the Interior
     - Bureau of Indian Affairs

Department of the Interior (Cont'd)
  Bureau of Mines
  Bureau of Outdoor Recreation
  Bureau of Sport Fisheries & Wildlife
  Geological Survey
  National Park Service
  Office of Coal Research

Federal Power Commission

Senator Frank Church
Senator Len B. Jordan
Representative Orval Hansen
Senator Gale McGee
Senator Clifford Hansen
Representative Teno Roncalio

State Clearing Houses:
  State Planning Coordinator, Governor's Office
    State Capitol, Denver, Colorado 80203
  Department of Planning & Community Affairs, State
    Capitol, Boise, Idaho 83702
  Utah State Planning Coordinator, Office of the Governor,
    State Capitol Bldg., Salt Lake City, Utah 84114
  State Planning Coordinator, Governor's Office, State
    Capitol, Cheyenne, Wyoming 82001

Other State Offices:
- Wyoming
  - Governor Stanley K. Hathaway
  - Air Resources Council
  - Department of Economic Planning & Development
  - Game & Fish Commission
  - Public Service Commission
  - Recreation Commission
  - University of Wyoming
- Idaho
  - Governor Cecil D. Andrus
  - Department of Public Roads
  - Public Utilities Commission
  - Fish and Game Department
  - Department of Aeronautics
  - Department of Highways
  - Idaho State University, Museum

Local Entities:
- Wyoming
  - Sweetwater County Planning & Zoning Board
  - Lincoln County Commissioners
  - City of Rock Springs

Wyoming (Cont'd)
  Town of Green River
  Town of Kemmerer
  Town of Cokeville
  Izaak Walton League
  Wyoming Wildlife Federation
  Wyoming Outdoor Coordinating Council

Idaho
  Idaho Wildlife Federation
  Idaho State Journal
  Pocatello League of Women Voters
  Chamber of Commerce, Pocatello
  Chamber of Commerce, Idaho Falls
  Idaho Environmental Council, Idaho Falls
  Town of Montpelier
  Town of Soda Springs
  Town of American Falls
  Bannock County Commissioners
  Bear Lake County Commissioners
  Caribou County Commissioners
  Power County Commissioners

Table of Contents

Page

I. Purpose of Proposal 1

II. Description of Proposal 1

A. General 1

B. Interrelationship Between Jim Bridger and Other Projects or Proposals 4

C. Summary of Statistics of Jim Bridger Plant 4

III. Alternatives to the Proposal 7

A. Other Sources of Electric Power 7

1. Delay or Non-Construction Alternative 7
2. Hydroelectric Alternative 8
3. Nuclear Alternative 9
4. Geothermal Alternative 10
5. Oil and Gas 10

B. Alternative Generating Plant Locations 10

1. Idaho Location 11
2. Green River Location 11
3. Other Locations 12

C. Alternative Regional Locations for Transmission Lines 13

1. Alternative Transmission Line Voltage 14
2. Alternative Corridors 15

IV. Description of the Environment 18

A. Existing Ecology 18

1. Desert Shrub Complex 19
2. Montane Forest-Mountain Shrub Complex 21

B. Existing Water Quality-Green River Basin 24

C. Existing Air Quality 25

D. Unique Communities - Rare Species 25

E. Wild and Scenic Rivers 26

F. Red Desert Management Study 26

G. Settlement Patterns 27

H. Economy and Cultural Patterns 27

I. Future Trends 28

V. Explanation of Analytical Procedure Used 30

A. Matrix Analysis 30

VI. Summary of Environmental Impacts 32

A. Generating Plant and Related Facilities 32

1. Stack Emissions 32
2. Generating Plant Impacts Other Than Emissions 38

B. Transmission Lines 45

C. Water Supply System 49

D. Coal Mine Operation 53

E. Cumulative Impacts 56

F. Accidents and Catastrophes 57

G. Unknown or Partially Understood Impacts 58

VII. Measures Taken to Enhance, Protect or Mitigate Impacts 59

A. Transmission Line Location 59

B. Water Pipeline and Surge Pond Location 64

C. Revegetation of Spoil Piles and Other Disturbed Areas 66

VIII. Adverse Impacts Which Cannot Be Avoided 67

IX. Short-Term Use vs. Long-Term Productivity 69

X. Irreversible and Irretrievable Commitment of Resources 71

XI. Consultation and Coordination 72

Exhibit I Map of Jim Bridger Project

Appendix A Explanation of Matrix System

Appendix B Matrices and Impact Assessment Statements

Appendix C Bureau of Reclamation Analysis of Emissions

Appendix D Owners' Consultants' Analysis of Emissions

List of References

I. Purpose of Proposal

The purpose of the proposed Jim Bridger complex is to meet the electrical power needs of Idaho Power Company and Pacific Power & Light Company customers in Idaho and the Pacific Northwest. The power produced will help meet the two companies' responsibilities to the "20-Year Hydro Thermal Program" of the Joint Power Planning Council, a coordinating group for 109 electric utilities in the Pacific Northwest, including the Bonneville Power Administration. According to the Program, 21,000,000 kilowatts of additional electrical power will be needed in the Pacific Northwest by the 1980's.

Idaho Power Company needs to increase its capacity now. It is scheduled to get the power generated by the first 500 MW Jim Bridger unit in June of 1974. Pacific Power & Light Company will receive the power generated by units 2 and 3 in 1975 and 1976 to provide for Pacific Northwest regional needs.

II. Description of Proposal

A. GENERAL

The Jim Bridger Thermal-Electric Generating Project, proposed by the Pacific Power & Light Company and Idaho Power Company, is located in southwestern Wyoming and southeastern Idaho. It involves four separate parts:

1. Coal fired power plant (1500 MW in size)
2. Three 345 KV transmission lines
3. Water pipeline and surge pond
4. Strip mine for coal

1. The power plant is to be located on private land 35 road miles northeast of Rock Springs, Wyoming and six miles north of Interstate 80. There are no residents within four miles of the proposed plant. The plant site covers approximately 500 acres. It includes three 500 MW thermal-electric generators, cooling towers, switch yard, and coal storage area. A seven-mile spur railroad leading from the plant to the main Union Pacific Railroad between Rock Springs and Rawlins and a parallel access road serves the site. The height of this plant will be about 236'. The smoke stacks are expected to be approximately 500' in height. Each generating unit will consume 250 tons of coal per hour.

2. The three 345 KV transmission lines originate at the plant and extend westerly 235 miles to substations in the vicinity of Pocatello, American Falls, and Idaho Falls, Idaho. The three lines parallel each other in a 460' wide right-of-way corridor until they reach Montpelier, Idaho, near the Wyoming-Idaho border. There the routes divide. See map marked exhibit I in the back of report for line routes and the location of other project features.

Each line will carry six conductors and two shield wires supported by aluminum towers up to 140 ft. high with an average line span of 1300 ft.

The land ownership through the Wyoming portion is a checkerboard pattern with about 50 percent of the area under BLM jurisdiction. The majority of the land traversed by the right-of-way in Idaho is privately owned except for about 10 miles across the Cache and Caribou National Forests and 45 miles across the Fort Hall Indian Reservation. The right-of-way in Idaho crosses only a few scattered parcels of BLM land.

3. In order to provide the estimated 18,100 gallons of water per minute required to operate the proposed plant, a 42-mile pipeline, 36" in diameter, will be installed below ground surface. The water is available from the Green River and has been purchased from the State of Wyoming. The pumping plant will be located just north of the town of Green River, Wyoming. From there, the pipeline will run north and east past Rock Springs, Wyoming to the plant site.

Water from the pipeline will empty into a 1,000-acre ft. surge pond which will hold a 10-day water supply for the plant. The pond will back up behind a 42 ft. high earth dam across a shallow draw. It will cover approximately 80 surface acres.

4. The coal necessary to operate the power plant will be mined from a 5,000-acre tract lying approximately four miles northeast of the plant site. The coal lands are under lease to the power companies from the Union Pacific Railroad Company and the U. S. Bureau of Land Management. Estimates indicate there are 100 to 150 million tons of coal in reserve, enough to operate the plant for 35 years. Coal is found in two horizontal seams ranging up to 30 ft. in thickness, with overburden to a depth of 150 ft. Plans call for strip mining of an average of about 125 acres a year. The overburden will be removed with large draglines casting overburden to one side as coal seams are uncovered. The coal will then be loaded into 120-ton trucks and hauled by truck road to the plant site. The overburden from the next strip will be deposited in the trench created by earlier stripping. The coal is reported to be low in sulphur (0.6% ave.) and averages about 10% ash.

B. INTERRELATIONSHIP BETWEEN JIM BRIDGER AND OTHER PROJECTS OR PROPOSALS

Jim Bridger will be an addition to several existing operations in the upper Green River basin that extract or process mineral resources. Coal is mined in the Rock Springs-Reliance areas; trona is mined and processed into soda ash north and west of the town of Green River. The mineral industries in both locations have announced major expansions. Along with their expansion plans, the trona mills are working with the Wyoming Air Quality Council to abate their emissions of particulates and gases. Additional strip mining for coal in the Rock Springs-Reliance area will also add dust to the air and perhaps affect water quality.

The Jim Bridger site lies about 100 miles east of the coal-fired Naughton Steam-Electric Plant near Kemmerer and 175 miles southwest of the Dave Johnston Plant near Casper. Both plants are presently being expanded and the new units will be equipped with particulate removal equipment. In addition, there are two Wyoming plants producing coke from coal, one located south of Rock Springs, the other near Kemmerer.

Besides these known mineral uses, oil shale development is a potential resource based industry. Recently announced national policies indicate a good possibility for pilot oil shale lease offerings in the near future. The location and extent of oil shale development cannot be predicted at this time, but it is known that the Jim Bridger powerlines cross part of the oil shale beds northwest of Rock Springs.

C. SUMMARY OF STATISTICS OF JIM BRIDGER PLANT

Location:	35 road miles northeast of Rock Springs, Wyoming (Sec. 3, Twp. 20 North, Range 101 West, 6th P.M.)

Elevation:	6,700 feet at the site
Units:	Three (3), costing approximately $300,000,000
On Line:	#1 3-74; #2 6-75; #3 '76 or later
Owned:	Jointly: Idaho Power Company - Pacific Power & Light Company
Operated:	Pacific Power & Light Company
Steam Gen. (Boiler)	(Combustion Engineering Company
Rated:	(3,930,000 pounds per hour
Size:	(206' high x 56' wide x 49' deep
Weight:	(12,000,000 pounds per unit
Turbine Gen.	
Rated Kw:	(508,558 Kw, Max. Output 552,967
Kva:	(Generator: 590,000 Kva
Size:	(131 feet long
Weight:	(1,000,000 pounds per unit
Coal:	(250 tons/hr. for each unit, full load, 10,000 BTU's/lb., (10% Ash, 0.6% Sulphur, 20% Moisture
Mine:	(Approx. 15 miles long, with seams approx. 30' deep, (and with 35 years of coal by stripping to 120 feet
Coal Haul:	3 to 10 miles with 120-ton, bottom dump trucks
Drag Lines:	55 cu. yds. with 300' boom; 14 cu. yds. with 175' boom.
Shovel:	16 cu. yds. w/approx. 11 tons of coal per dip

(Drag lines & shovel electrically operated.)

Pipeline:	42 miles, 36" dia. pipe, 800' static lift
Est. Water:	18,100 gallons per minute
Consumption:	29,200 acre feet per year, or 40 cu. ft. per second
Surge Pond:	80+- surface acres; 1,000 acre feet
Railroad:	7-mile spur from Point of Rocks
Cooling Towers: ea.	342' long x 68' wide x 63' high

Chimneys:	Approximately 500 feet high
Flue Gas under Full Load	With Precipitator, 2,160,000 cu. ft. per min. @ 250° F. With wet scrubbers, 1,900,000 cu. ft. per min. @ 170° F. 5,700,000 pounds per hour

Building:

Height:	236 feet
Length:	710 feet
Width:	305 feet

Transmission Lines: 345 Kv; 235 Mi. Long, consisting of:

1-Borah (American Falls)
1-Kinport (Pocatello)
1-Goshen (Idaho Falls)

III. Alternatives to the Proposal

A. OTHER SOURCES OF ELECTRIC POWER

The schedule for the Jim Bridger plant adopted by the Joint Power Planning Council has been adjusted to compensate for the delay in construction of a proposed nuclear plant near Eugene, Oregon, because of environmental issues. It provides that all three 500 MW generating units of Jim Bridger be operative by 1976. Because five years or more are needed to locate and design power plants and associated transmission lines of this magnitude, with at least five more years for construction, no alternatives are available if the time schedules are to be met. The Companies expect to complete construction of all three generating units by September 1976.

1. Delay or Non-construction Alternative

One alternative would be to attempt to locate alternative sources of power and delay the construction of the Jim Bridger plant in the interim. Another would be not to construct the Jim Bridger plant and make no attempt to satisfy the projected power needs. Either alternative would have the effect of slowing down Pacific Northwest economic growth, at least between 1970-1980. The Office of Science and Technology discusses the issue in the following terms:[1]

"The Rate of Growth in Demand

"1. The rapid growth in demand for electricity, energy and materials generally will continue to exacerbate the environmental problems even though part of the growth will be needed to utilize electricity for uses such as sewage treatment plants, rapid transit systems, and recycling wastes which affect major improvements in

---

[1] The Energy Policy Staff, Office of Science and Technology, Electric Power and the Environment. August 1970.

the quality of the environment. The issue is often raised: 'Is this plant really needed?' But the basic question of whether electricity use is growing too rapidly cannot be answered on an individual plant basis. It is but part of the much larger and fundamental question of the pattern of growth of the Nation's future. An answer requires a broad examination of the significance of all forms of energy to the economy and the public welfare, including analysis of the form and amount of energy that would be used if the projected increases in electricity consumption were materially curtailed. It would also involve an examination of pricing policies, rate structures, advertising programs, tax policies, and other factors in the economy affecting growth.

"2. The relative costs and benefits of present policies as contrasted with a policy of discouraging growth in energy use should be carefully evaluated. It may well be timely to re-examine all of the basic factors that shape the present rapid rate of energy growth in the light of our resource base and the impact of growth on the environment. We raise the issue here for further study and discussion."

2. Hydroelectric Alternative (after 1976)[2]

With the exception of the middle Snake River, the Salmon River, the Clearwater River, and the middle Columbia River (Hanford-Wenatchee section), all potential sites for major main stem hydroelectric projects in the Pacific Northwest have been or are being developed. All four rivers or river segments are presently free flowing. Public sentiment against dams and in favor of dedicating all these rivers as free flowing is very strong. Although undeveloped hydro potential does exist on lesser tributaries of the Columbia, such as the Wenatchee, Snoqualmie, upper Snake, Flathead, and Kootenai, the power output would be small in comparison to the Jim Bridger plant.

[2] Pacific Northwest River Basins Commission, Columbia-North Pacific Region Comprehensive Framework Study, Appendix XV Electric Power. 1970. Also Joint Power Planning Council, 20-Year Hydro-Thermal Program.

One long-range possibility may be the purchase of additional hydroelectric power from Canada. This alternative would be subject to several complications. The most significant of these is the present Canadian policy which bars power exports except for interchange agreements and in emergency situations. Even if this obstacle should be overcome, there remains the problem that hydroelectric resources in Canada are subject to the same environmental pressures as similar projects in the United States; their development for export probably would encounter even stronger opposition.

3. Nuclear Alternative (after 1976)

In the long run nuclear power plants may conclusively prove their superiority over fossil fuel plants. This is not yet an accomplished fact from either an economic or an environmental standpoint. The merits and demerits of nuclear plants have been widely discussed and need not be repeated here. The relative advantages of nuclear vs. coal-fired thermal plants often vary with geographic location. The reasons that led Pacific Power & Light Company and Idaho Power Company to select the Wyoming coal alternative are found on page 15 of the Companies' Environmental Impact Study Report which states in part,

> "Consideration by Pacific Power & Light Company of the means by which it could meet its share of these growing regional demands led the company to conduct an intensive study of the relative merits of thermal power generation utilizing Wyoming coal, in comparison with a nuclear development located in closer proximity to the load centers of the Pacific Northwest. This study clearly dictated the choice of the Wyoming development . . ." [3]

---

[3] Copies of this report are available for reading at BLM offices in Rock Springs and Cheyenne, Wyoming and Washington, D. C. A limited number are available on a loan basis. Contact - Bureau of Land Management, P. O. Box 1828, Cheyenne, Wyoming 82001.

4. Geothermal Alternative (after 1976)

The potential for power production from geothermal sources in the Pacific Northwest is unknown. Exploration began on a modest basis in 1971. It will take decades for the necessary exploratory work to be completed and the techniques for power generation from this source to be perfected for Northwest conditions. The economics of this method of power production in the Pacific Northwest are very uncertain. Speculation by a representative of the Oregon State Department of Geology and Mineral Industries concerning the amount of geothermal power that may eventually be developed in the Pacific Northwest indicated a range from near zero to 30,000 MW.

5. Oil and Gas Alternative

There are no known oil and gas fields in the Pacific Northwest. In any event these fuels are comparatively scarce and much more expensive than either coal or uranium for base power generation. These fuels are totally committed to other higher priority markets and are not a viable alternative for supplying a portion of the Pacific Northwest base power load in the foreseeable future. However, there is a limited potential use for oil and gas fired turbines to supply a portion of the peaking or emergency standby power generation.

The only apparent possibility for meeting the projected medium-range power needs is through thermal generating plants. As such plants are built, they would increasingly provide the firm power base with the hydro units being used for peaking power purposes.

B. ALTERNATIVE GENERATING PLANT LOCATIONS

Of the technological possibilities identified, the utility

companies have selected fossil fuel as the energy source. Pacific Power & Light Company controls an extensive coal field in southern Wyoming through leases from the Bureau of Land Management and the Union Pacific Railroad. They have held these leases since 1966. Idaho Power Company owns transmission lines, substations and other transmission facilities across western Idaho with connections to the Pacific Northwest. The following alternatives were explored by the Companies before deciding to share the Jim Bridger facility:

1. Idaho Location

Idaho Power Company considered building their own plant at a site near American Falls, Idaho, on the Snake River. If this alternative were followed, the result would be two, somewhat smaller plants -- one for each company. The Bureau of Reclamation has this to say about local dispersion of smaller plants --

> "Single plant construction is preferable to multiplant because of economic considerations. Control of flue gas emissions from a large plant will likely attain slightly better efficiency and lower unit costs than the accumulated efficiency of two or more smaller plants with the same total capacity . . . .
>
> "The economy of improved air pollution equipment for air contaminants, such as SO^2, might be better at one large plant. The installation of many small plants would require significant increases in right-of-way requirements for transmission lines, access roads, coal hauling routes, plant sites and substations, and ash disposal areas." 4/

2. Green River Location

The power companies also considered the possibility of locating the plant site adjacent to the Green River. This proposed alternative would have necessitated transporting the coal from the Pacific Power &

4/ Bureau of Reclamation, Study of Environmental Factors, San Juan Generating Station, May 1971.

Light Company mine to the plant site, a distance of 42+ miles, by rail, truck, or a slurry method utilizing an underground pipeline. The study of this proposal indicated several environmental and economic problems. Pollution of the Green River by the potential discharge of warm or contaminated boiler, blowdown or coolant waters could be expected. The disposal of fly ash, residues and other contaminents would be a major problem whereas if the generating plant were located at the mine site, the subject materials could be disposed of beneath the reclaimed or mined-out portions of the stripping operation. A plant site along the river would reduce valuable shoreline available for other potential uses. In addition, the plant complex, including access roads, rail spurs, coal stock piles and other related needs, would have created very questionable aesthetic conditions in this more populated and visited area. Economically, the cost of transporting the generally low quality coal (7,000 - 9,000 btu's) to a plant site along the Green River would also, according to company data, cost considerably more than transporting water to a plant site located near the mine area.

3. Other Locations

If the plant were located in a metropolitan area, there would be an increase in the per capita influence of pollutants and/or visual awareness, even if the pollutants and visual aspects were kept to a minimum standard. The location of this plant in a remote area has the advantage of reducing the congestion and impacts in any major load and population center where the plant might otherwise be placed. The cost of transmission is largely, if not totally, offset by the savings realized by not having to transport the tremendous quantities

of coal involved to a load center and by the partial utilization of existing power distribution facilities. The location of the proposed generating facility in some other remote area would probably not significantly alter potential environmental effects.

C. ALTERNATIVE REGIONAL LOCATIONS FOR TRANSMISSION LINES

The guidelines adopted by the Departments of the Interior and Agriculture and included in the 1970 publication "Environmental Criteria for Electric Transmission Systems" emphasize the need for long-range land use planning, the extensive use of utility corridors, and coordination of industry and government beginning early in the planning stages. The Office of Science and Technology in its 1970 publication "Electric Power and the Environment" makes similar recommendations.

The general location of Interstate 80 and the Union Pacific Railroad across southern Wyoming and Idaho offers one of the most favorable transportation corridors for crossing the Rockies and other mountainous terrain to the Pacific Northwest. A route roughly paralleling Interstate 80 and the railroad also offers one of the most favorable locations, from both the environmental and economic point of view, for a high voltage power intertie between the Pacific Northwest and the Midwest power systems. The Pacific Power & Light Company-Idaho Power Company route through southwestern Wyoming and southeastern Idaho in combination with similar high voltage transmission via Montana appears to offer the best westward transmission routing for power from future power plants which may utilize the estimated 23 billion tons of strippable coal reserves of Wyoming. 5/

5/ USDI, Bureau of Mines, Strippable Coal Reserves of Wyoming, Preliminary Report 181, December 1970.

The specific location sought by Pacific Power & Light Company and Idaho Power Company for the three parallel 345 KV lines through southwestern Wyoming and parts of southeastern Idaho also appears to be the best potential location for any additional transmission line capacity through that area. The Power Planning appendix for the Columbia-North Pacific Framework Plan anticipates the need for one extra high capacity intertie through southern Wyoming and one through Anaconda, Montana, by 1990 (p. 142 and fig. 19).

1. Alternative Transmission Line Voltage

An alternative to the proposal for three 345 KV lines would be construction of two 500 KV lines. Each 500 KV line would have approximately double the capacity of a single 345 KV line. Despite their approximately 25% less capacity, the three 345 KV lines will have compensating advantages. Individual 345 KV lines, the first timed to system requirements prior to Unit No. 1 and the next two to installation of Units 2 and 3, are better adapted to the integration of generation and reinforcement of the existing system. Two 500 KV lines, while suitable for bulk transmission along the main corridor, would not be well adapted to the proposed tap points at Goshen and Kinport substations. The two 500 KV lines would require construction of an additional reinforcing line, probably at 230 KV, plus an additional substation near Montpelier. Also three single circuit 345 KV lines are considered to be more reliable than either two 500 KV lines or a single circuit and a double circuit 345 KV line.

Should greater line capacity be required in the future, these lines could be upgraded to an appropriate higher voltage depending on

the circumstances at that time. To do so would require adequate right-of-way for a fourth line, which would be constructed and in service before the older line or lines were de-energized for rebuilding. This fourth one could be the extra high capacity intertie described above. Future upgrading could also include undergrounding if it becomes feasible.

The permit to the applicants could require that any future transmission lines needed to carry power across southern Wyoming would be restricted to the proposed corridor and that the total number of parallel lines for all electric utilities combined could not exceed four; any further increase in capacity could require upgrading of existing lines.

2. Alternative Corridors

a. Route of Existing 230 KV Line

Exhibit I in the back of this report shows an existing 230 KV east-west transmission line to the south of the proposed route. A logical question would be -- why not corridor the proposed three lines along the route already committed to powerline use: There are two supporting reasons for this line of thought:

(1) Paralleling an existing line would avoid placing man-made improvements in relatively undisturbed areas.

(2) Both guidance documents (Environmental Criteria for Electrical Transmission System, USDI & USDA; and The Impact of Power Transmission Lines, BLM, USDI) indicate corridors of compatible use should be investigated thoroughly and where feasible they are preferred.

Objections to this alternative hinge on the premise that the existing 230 KV wood H-pole line is poorly located by today's standards.

Adding three 345 KV metal tower lines to a poor location would increase the visual impact of the corridor. This conclusion is based on the following locational factors for the 230 KV line.

(1) The line crosses U. S. Interstate 80 east of Rock Springs. (I-80 has an average daily traffic of about 3,700 vehicles.)

(2) It crosses the middle of an area planned for expansion of recreation facilities for Rock Springs and one of the logical expansion paths of the town.

(3) It crosses a potential reservoir site on the Green River. If constructed, the water body will attract moderate recreation use.

(4) It is highly visible from long stretches of U. S. Highway 30 N., a major highway.

(5) It is within view of the proposed Fossil Butte National Monument, west of Kemmerer, Wyoming.

(6) It crosses the upper end of Bear Lake in Idaho, much of which is administered as a state park.

b. Route of Existing 161 KV Line

As originally proposed, the single 345 KV line from Montpelier, Idaho, to the Goshen Substation presented several land use conflicts. A major conflict was location near and parallel to the Blackfoot River which would have impacted recreational, historic and scenic values.

Alternative routes were examined during the October 1970 joint meeting at Soda Springs, Idaho. One alternative identified would be to route the new 345 KV line parallel to the existing 161 KV Utah Power and Light line which proceeds northwest from the Bear River Valley to

the Goshen Substation. (See Exhibit 1, map of transmission system). The alternative would require routing a third 345 KV line west across the Cache Forest, diverting in the vicinity of Grace, Idaho, then routing parallel to the existing 161 KV line. The following factors and impacts were identified during the analysis:

(1) A route paralleling the existing 161 KV route would utilize the corridor concept for power planning -- the 345 KV line would be added to an area already impacted. Conversely, the company proposal utilizes a "new" location.

(2) Conflicts identified with the original company proposal would be eliminated by adopting a corridor along the existing line. However, Idaho Power has adjusted the location to reduce original conflicts with their proposal. These adjustments are described in detail in Section VII A., under items 5, 6, 7 and 8.

(3) The existing 161 KV line is poorly located by today's standards. For the first 30 miles it proceeds nearly up the center of the Gem and Portneuf Valleys with adverse effects on agricultural lands and on esthetics for residents and travelers on Highway 30N. Approximately 15 miles north and east of Soda Springs, Idaho, the existing line adversely impacts recreational and esthetic values of the Portneuf River and Reservoir.

(4) Addition of a third 345 KV line across the Cache National Forest and adjacent valleys would add to adverse impacts which cannot be avoided in this area.

(5) One additional alternative which can be considered for the existing 161 KV line is that it be identified in long range

power planning for dismantling and abandonment when it becomes technologically outmoded.

IV. Description of the Environment

A. EXISTING ECOLOGY

For convenience, the life zones involved in the Jim Bridger Project are grouped into two major associations - the DESERT SHRUB COMPLEX and the MONTANE FOREST-MOUNTAIN SHRUB COMPLEX. Although some species of plants and animals are found in both areas, they are easily separated by topography and dominant vegetation. The following illustration gives a rough approximation of these factors for both environments. It depicts the vegetative types and ranges in elevation traversed by the principal right-of-way for the power transmission line.

Following the exhibit is a short narrative discussion of each complex.

ADAPTED FROM: UPPER COLO. REGION COMPREHENSIVE
FRAMEWORK STUDY APPENDIX VI AND
OTHER SOURCES

SCALE: 1" = APPROX. 8 MILES

Generalized Vegetation and
Topography Traversed by
Principal Transmission
Line Right-of-Way

1. DESERT SHRUB COMPLEX

a. Physical Characteristics

Elevation ranges from 5500 to about 7,000 ft. above sea level. There is an annual rainfall of 6 to 15 inches and a 90 to 120 day frost free period.[6] The dominant soils have loamy surface layers with low organic matter content. Shrubs dominate the vegetation. Low growing, salt tolerant shrubs such as the salt bush, shadscale, and bud sage, occupy the lower, drier sites, while big sagebrush with a mixed mid-grass understory characterizes the higher, more moist sites. The terrain is rolling bench lands, cut by north to south trending drainages. The Green River, a tributary of the Colorado River, is the major drainage.

b. Major Ecological Relationships

The shrubs that give this complex its name support a variety of wildlife and other fauna. Major relationships include: critical winter feed for antelope; feed, cover, and nesting sites for sage grouse (year round habitat); and winter forage for domestic livestock. The desert shrub vegetation is stable under existing extensive land uses. Grazing in all seasons, oil and gas fields, roads, railroads, and mineral developments such as coal mines and trona processing have all disturbed the ecology. Due to this disturbance, changes in microclimate, flora, fauna, and food chains have taken place, but have been limited to the sites where disturbance occurs. Accelerated erosion is imminent when the surface vegetation is removed. If erosion takes away the thin mantle of

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[6] State Engineer's Office, Wyoming Water Planning Program Report, No. 3, Water and Related Land Resources of the Green River Basin, Wyoming, September 1970.

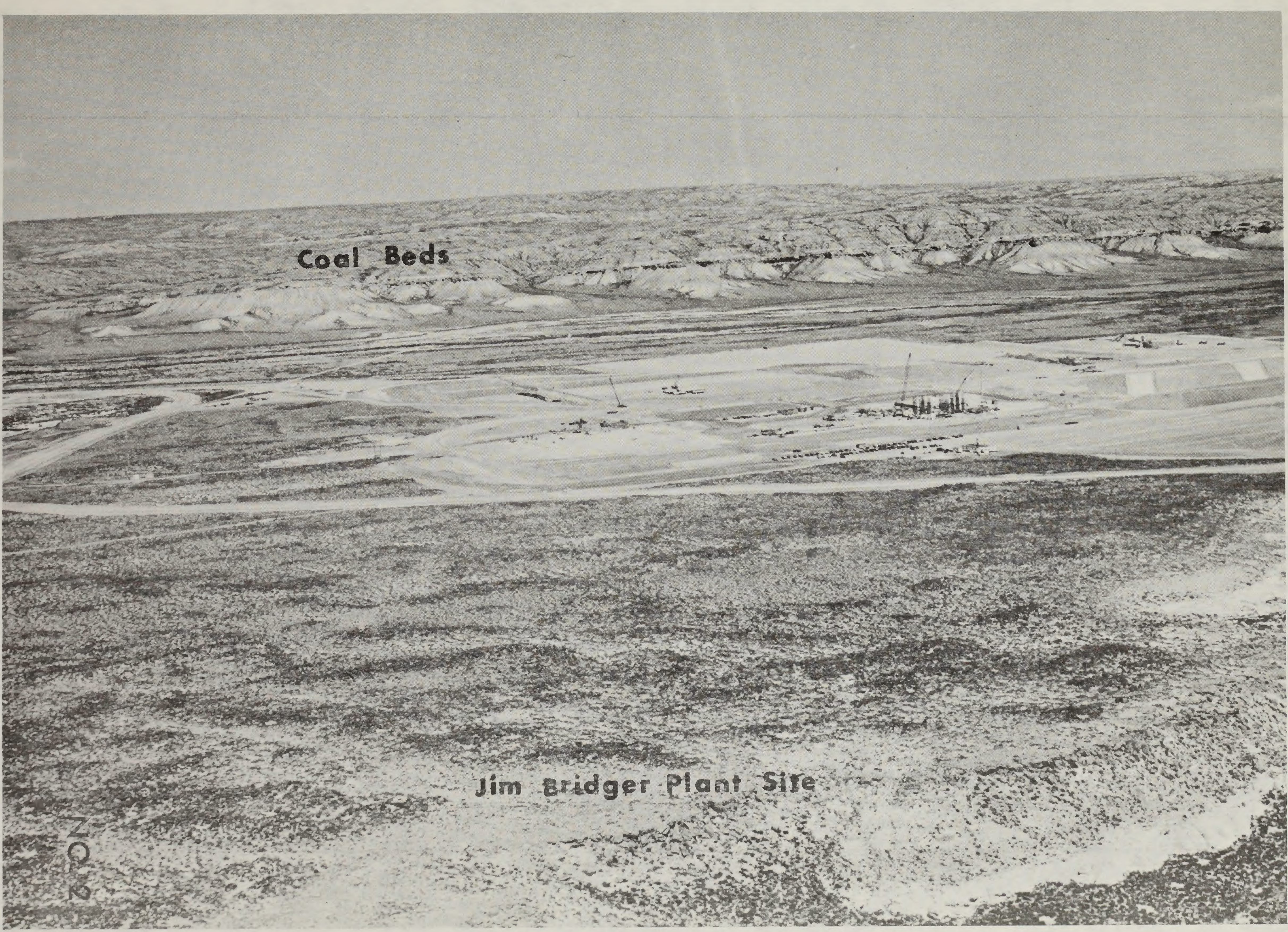
soil containing organic matter, long term damage results. Reseeding disturbed areas with introduced grass species is possible, but moisture and seed bed conditions must be just right. Failure to reintroduce permanent vegetation often results in invasion of disturbed sites by halogeton, an annual plant poisonous to sheep.

c. Land Use

Grazing, mineral extraction, transportation and outdoor recreation (hunting and rockhounding) are the major uses. Communities are small (10,000 people and under), widespread, and located along major transportation routes.

The areas where the Desert Shrub complex occurs do not lend themselves to intensive land use. Irrigation water is required for farming, and yields are low compared to lands in the more favorable climate occurring at lower elevations. Rockhounding, sage grouse hunting and antelope hunting are the major recreational public uses.

The photo on the next page shows a typical example of the Desert Shrub complex.


Coal Beds
Jim Bridger Plant Site
NO. 2

2. MONTANE FOREST-MOUNTAIN SHRUB COMPLEX

a. Physical Characteristics

This vegetative complex contains a diverse combination of valleys, bench lands, rolling foothills, steep mountain slopes and ridges. Most mountain ranges are oriented north-south. Elevations range from 5000 to 8500 feet and precipitation varies from 12 to 40 inches per year according to elevation.

Soils, like landform, vary greatly. Montaine Forest soils are typically cool and moist with a dark surface layer. Bedrock may be exposed on ridges; deepest soils occur in swales. Mountain Shrub associated soils occupy the lower to mid portion of mountain slopes down to alluvial fans and lakebed terraces near the valley floors. These soils are warmer and have less organic matter in the surface horizon than the high elevation soils.

Shrub species of juniper, sagebrush, mountain mahogany, and bitter brush with a grass understory are quite representative of the Mountain Shrub Zone. As effective precipitation increases (primarily due to elevation and aspect), the Shrub Zone grades into a forest overstory of Douglas-fir with a shrub-grass understory. High meadows and groves of quaking aspen are common throughout the higher elevation zone.

b. Major Ecological Relationships

Rain and snow at higher elevations are important sources of water yield for adjacent valley bottoms and arid portions of the region. The natural environment supports a

diverse wildlife population; the relationship of plants and animals is complex. Certain aspects are critical to survival of species such as elk and deer. Winter habitat occurring in Mountain Shrub zones has been reduced by agricultural activities and is therefore a limiting factor for elk and deer populations.

The Montane Forest areas involved are generally undisturbed and in a natural condition except for the impacts of livestock grazing and limited mining, timber harvest, and human use. Access into these areas is poor, primarily because of steep topography. Mountain Shrub zones and adjacent valleys have been drastically altered where dry-land or irrigated farming has been initiated.

The natural capacity of the vegetation to heal or revegetate disturbed areas is quite good providing the disturbance does not remove top soil. However, because of steep topography, the erosion hazard is high until ground cover is re-established. Natural or geologic rates of erosion are estimated to be low.

c. Economy and Land Use

Agriculture is the dominant economic sector in this vegetative zone (ranching and dry land wheat production) in the area of concern. Phosphate rock production increased rapidly during the 1950's and '60's; southeast Idaho is currently leading production in the west.[7/] Recreation-tourism is growing in importance, principally by local people

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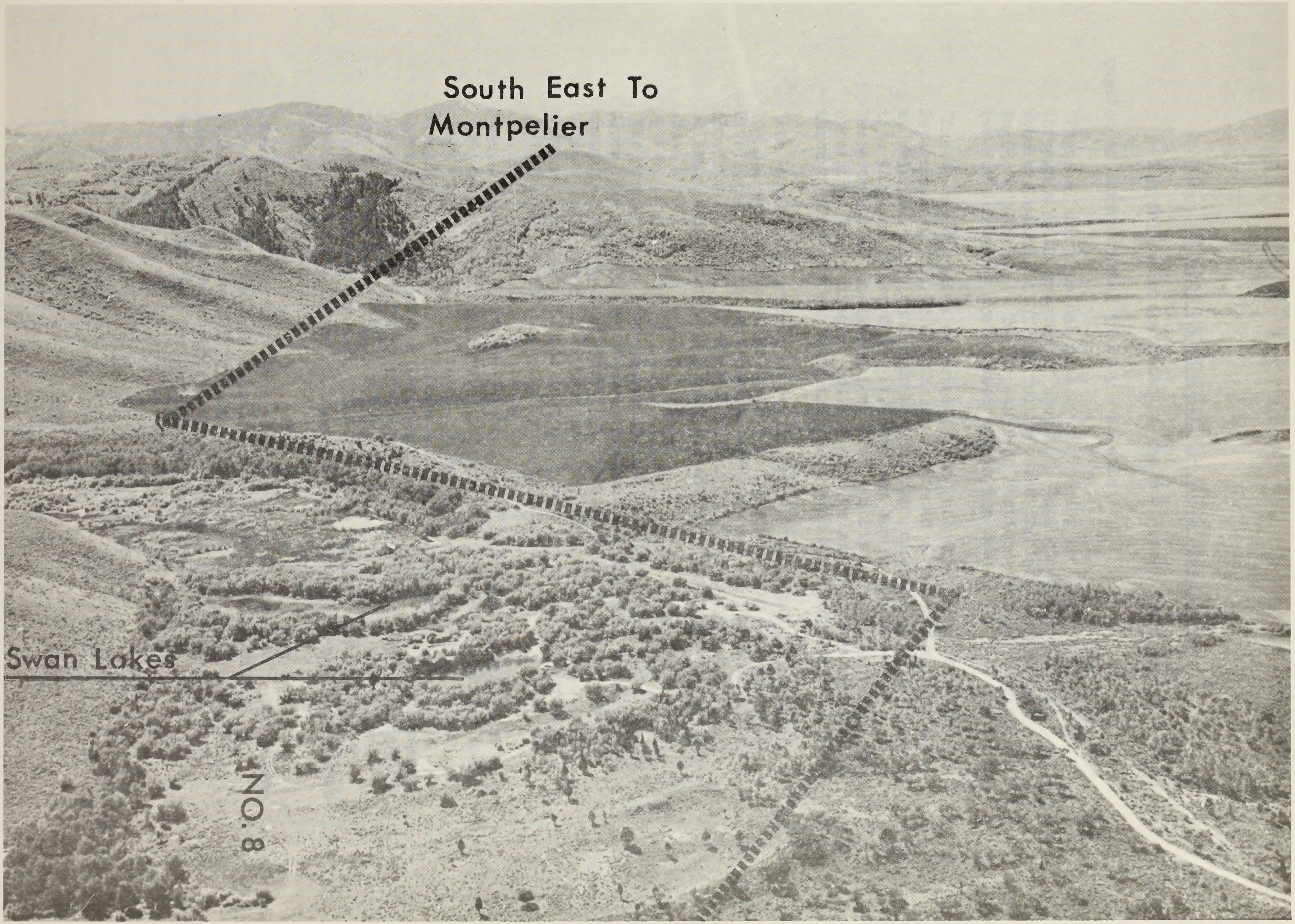
[7/] USDI Bonneville Power Admin., Pacific Northwest Economic Base Study for Power Markets, 1970, p. 69.

or by out-of-region visitors traveling to other major recreation areas such as Yellowstone Park. The area is not typically a final destination point for tourism.

The photo on the next page is indicative of the complex. The transmission line route and place names are referred to later in the analysis.


South East To
Montpelier
Swan Lakes
NO. 8

B. EXISTING WATER QUALITY - GREEN RIVER BASIN

The following quotation is the most recent comprehensive discussion of current water quality available:

> "Physical and chemical quality monitoring is done continuously through a joint program of the U. S. Geological Survey, the Wyoming Department of Agriculture, and the Wyoming State Engineer's Office. Twelve sampling stations (ten for chemical, two for sediment) are located within the Basin.
>
> "Due to the adoption of water quality standards, the Wyoming Department of Public Health has initiated a monitoring program at selected sites to detect serious bacteriological contamination in Green River Basin streams from May to September. Bacteriological contamination is an important indicator, and, if excessive, the indicated pollution is relatively easy to correct through conventional water treatment such as chlorination.
>
> "The Wyoming Department of Public Health has established radiological monitoring stations on the Green River at Daniel, Green River, the Fremont Lake outlet, and also on the New Fork River near Pinedale and Big Piney. The monitoring program is to collect background data for an historical base reference period. ....
>
> "The availability data generally indicate that the waters of the Green River Basin are of excellent bacteriological, radiological, chemical, and physical quality, although salinity from natural sources and return flows increases in the lower reaches of some streams. Salinity is the most difficult water quality problem to trace and is the most costly to treat.
>
> "There are two basic causes of salinity increases in a stream, and they need to be distinguished. These are the 'salt loading' and 'salt concentrating' effects. Salt loading is produced by the discharge of additional minerals from municipal, industrial, agricultural, or natural sources into a stream. The salt concentrating effect occurs as a result of the diversion and consumptive use of water. In this case, the salt load diverted and returned to the stream is the same, but there has been a consumption of pure water and a loss of this water from the system which increases the concentration.
>
> "Few irrigation return flows are monitored in the Basin, and therefore it is difficult to quantify the salinity contribution. Observations since 1955 by the U. S. Bureau of Reclamation at the Eden Project in Sweetwater County show salt yields ranging from two to six tons per irrigated acre per year. ....

> "At present, most area industries use 100 percent of their diversions. Except for the fact that this reduces the capability of the stream to dilute other salinity sources, this has no effect on salinity." [8]

The effect on downstream salinity as a result of diverting 30,000 acre feet at Green River, Wyoming, is discussed in Section VI.C.1.

C. EXISTING AIR QUALITY

The Air Quality Act for Wyoming, signed on March 3, 1967, empowers the State Department of Health to enforce the policy of the State -- to maintain a reasonable degree of purity of the air resources. To date no monitoring programs to determine ambient air quality of the Rock Springs vicinity have been initiated by the State. It should be noted, however, that five western Colorado communities that have been tested (including the town of Rifle - 140 miles south of Rock Springs) failed to meet both Federal and State recommended levels of particulates in 1968 and 1969.[9] Whether this pattern holds up in Wyoming is not known. The visibility range almost always approaches the unlimited in the vicinity of the plant. One exception is during the frequent periods of high winds when dust (and larger) particles are airborne.

D. UNIQUE COMMUNITIES - RARE SPECIES

There are no unique communities of plant and animal life involved in any component of the project. Each major zone encountered occupies hundreds of square miles. These zones are

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[8] State Engineer's Office, Wyoming Water Planning Program Report No. 3, Water & Related Land Resources of the Green River Basin, Wyoming. September, 1970.

[9] Upper Colorado Region, Comprehensive Framework Study, Appendix XV, Water Quality, Pollution Control and Health Factors.

the habitat for several rare and endangered species such as the black footed ferret, greater sandhill crane, Colorado River cut-throat trout, Colorado River squawfish, prairie falcons, and the tule-white fronted goose. No single area can be viewed as critical to their existence and no colonies or other concentrations are known to exist in the path of the project.

The preceding treatment of the many interrelationships between climate, soils, vegetation, animals and man is necessarily broad in nature. For a more thorough (but still general) treatment, two documents are recommended. They are: (1) Upper Colorado Region, Comprehensive Framework Study, Appendix VI - Land Resources and Use and (2) Columbia North Pacific Region, Comprehensive Framework Study, Appendix VIII, Vol. 1 (see list of references for full citation).

E. WILD AND SCENIC RIVERS

The transmission lines cross several rivers and streams, none of which have been proposed for study under the Wild and Scenic Rivers Act. The Upper Green River is the closest designated study river, but it is far upstream from the line crossing.

F. RED DESERT MANAGEMENT STUDY

The plant site is situated about 25 miles inside the west boundary of the Red Desert planning area. This 5 million acre area stretching east some 120 miles from the plant is undergoing an intensive analysis of both the values found there and the increasing conflicts between resource users. The management study is designed to resolve these conflicts. Both local and national levels of

various conservation and wildlife groups have expressed interest in this largely unfenced area. They have placed particular emphasis on establishing an antelope range.

G. SETTLEMENT PATTERNS

The Union Pacific Railroad with its need for manpower, not only to build and operate the railroad but also to mine coal for fuel, dominated other factors that determined the population make up of southwest Wyoming. Underground mines centered around Rock Springs attracted people because work was available. The railroad also offered an easy route to market for large ranches. Ranch headquarters are typically found scattered along the rivers and larger streams where irrigation water is available. Between the water courses, mile upon mile of unpopulated land is found. Well over two thirds of the population now live in towns and communities.

H. ECONOMY AND CULTURAL PATTERNS

The social, economic, and cultural patterns of Wyoming and Idaho have been, for the most part, formed by the same forces. Having more water available in Idaho has led to more intensive agriculture and increased the population there as compared to southwest Wyoming. A brief description of Sweetwater County, Wyoming, follows because it is by far the area most heavily affected by the project.

With a projected growth in population from 18,391 in 1970 to 27,700 in 1980, this county is one of the fastest growing areas in Wyoming. The county's trona industry, oil and gas

production, and coal mining dominate the basic industries of the Green River Basin in Wyoming. The Basin had an industrial employment of 2,186 in 1967 and a projected growth to almost 5,000 for 1980. The payroll is expected to grow from 19 million to 44 million in the same period. (All data[10]).

Rock Springs and Green River are the trade centers of the region. A combined service and retail employment sector of 3,599 people is expected to grow moderately as the Government and recreational service elements increase.[11] Interstate 80 traffic supports motel and restaurant services beyond that expected in a town the size of Rock Springs.

Agriculture, with its 250 employees[11] and 5-1/2%[10] of the county's assessed valuation, is not expected to exhibit a large growth in the next decade.

Sweetwater County exhibits a diverse ethnic and cultural makeup because of the employment available during the different period of immigration. Because mining and power production will not change traditional employment patterns, cultural values will not be disrupted by implementation of the proposal.

I. FUTURE TRENDS

The social and economic trends exhibited are not expected to change. Oil shale development, if it occurs, will add to the existing trends. All of the developments discussed

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[10] State Engineer's Office, Wyoming Water Planning Program, Report No. 3, Water and Related Land Resources of The Green River Basin, Wyoming, September 1970.

[11] Unpublished data made available by the Rock Springs school system.

can be easily accommodated in Sweetwater County's six and one-half million acres of land without materially changing present extensive land use patterns.

V. Explanation of Analytical Procedure Used

A. MATRIX ANALYSIS

A comprehensive environmental analysis of the Jim Bridger Complex was made by following the evaluation procedure described in Circular 645 of the U. S. Department of the Interior, Geological Survey. This provided a systematic approach to identifying and evaluating the impacts that the actions proposed to develop the Jim Bridger Complex would have on the various environmental characteristics and conditions. All of the proposed actions were individually evaluated against each existing environmental characteristic. Any resulting impact was given a numerical rating within a scale of 1 to 10 in terms of both the magnitude of the impact and the degree of importance of the particular action on the specific environmental characteristic. In both cases 10 represents the greater impact.

The term "magnitude" is used in the sense of degree, extensiveness or scale. The analysis of magnitude is intended to exclude preference or bias and rely as much as possible on factual information. The evaluation of "importance" considers the consequence or significance of changing a particular condition on other factors in the environment. This rating is principally a value judgement on the part of the evaluators.

The analysis was made using a matrix consisting of 100 possible proposed actions which may cause environmental impact, on the horizontal axis, and 88 characteristics of the existing environment which may be affected by the proposed actions, on the vertical axis. Points of

interaction were then checked and given a numerical rating as indicated above. The matrix analysis provides for comprehensive review of the variety of interactions that might be involved by all components of the complex. A more detailed explanation of the matrix system is contained in Appendix A.

The Jim Bridger Project analysis was conducted by an interdisciplinary team of natural resource specialists. A separate matrix analysis was prepared for each of four major facilities: the generation plant, transmission lines, coal mines, and water supply system. The four major matrices and their impact assessments are presented in Appendix B.

The plant site and portions of the transmission lines and pipeline are included in an area selected by Bureau of Land Management for an intensive study of multiple use management. This effort, known as the Red Desert Study included a detailed inventory of known resource and human values. The Jim Bridger facilities involved were reviewed in light of the results of the inventory; no significant conflicts were found.

VI. Summary of Environmental Impacts

A. GENERATING PLANT AND RELATED FACILITIES
(Plant, Railroad Spur Line, and Paved Access Road)

Because of the complexity involved, the impacts of the plant will be analysed somewhat differently than the rest of the project components. Plant emissions have an across-the-board effect on several of the environmental categories. These are more easily described under one heading. After the following discussion of stack emissions, the format returns to an analysis of each environmental characteristic.

1. Stack Emissions

The portion of the proposed power plant complex identified on the matrix as having the greatest interaction and affecting the listed environmental characteristics most often is stack emissions. In fact these emissions are potentially as significant as all other environmental impacts combined.

In the absence of precise design criteria, it is difficult to adequately assess these emissions. On the basis of meteorological data and design criteria currently available, an independent analysis and predictive model has been prepared by the Bureau of Reclamation working with the Tennessee Valley Authority. The results of this analysis are added to this report as Appendix C.

A report by the Owners' Consultant concerning ground level concentrations for sulfur dioxide, particulates and nitrogen oxides is included as Appendix D.

The following reflects the information available as of August 1, 1971.

a. Companies' Plans for Air Pollution Abatement Equipment[12]

The Companies plan to use electrostatic precipitators to remove fly ash and other particulates. According to Company spokesmen, bids for the precipitators must meet a design criteria falling between a "clear stack" and an opacity rating of No. 1 on the Ringelmann Chart; in other words, nearly invisible except for water vapor. They maintain that such a standard is considerably more stringent than the State of Wyoming's requirement of not to exceed 0.18 lbs. of particulates per million BTU per hour. They also state that it is expected to meet the more demanding Federal New Source Performance Standards which will be issued in the fall of 1971. Invitations to bid on the equipment have been submitted to three European firms, the only ones the Companies found that could meet the design standards.

Because of their low sulphur coal, they do not plan to install sulphur dioxide removal equipment initially but the physical design of the stacks and related equipment will permit installation in the future if necessary.

The Companies will adopt their final design of stacks and air pollution abatement equipment after meteorological studies are completed and flue gases from representative samples of Jim Bridger coal are tested in a pilot precipitator.

The following information was received from Pacific Power & Light Company on August 16, 1971.

12/ S. L. Campagna, Company Coordinator for the Jim Bridger Project. Oral statement to BLM team preparing the environmental statement, July 16, 1971.

b. Jim Bridger Plant Emissions

"The following emissions are based upon analysis of all of the core samples taken from the coal field. The maximum concentrations of all substances will not occur at the same time since the extreme of each substance as shown results from different core samples in different parts of the coal field. Similarly, minimum concentrations will not occur simultaneously.

"These emissions are for one unit based upon maximum load with turbine valves wide open, 5% over pressure, 20% excess air, and normal expected air leakage into the boiler casing. The concentrations are on a dry gas basis.

"Substance		Core Sample #	Lb./Hr.	Ton/Day	PPM (by volume)
Particulates	Max:	225 FC	325	3.9	64(by weight)
	Min:	115	197	2.4	39(by weight)
SO_2	Max:	125	7,840	94.1	715
	Min:	236	3,640	43.7	342
NO_x as NO_2	Max:		3,900	46.8	500
	Min:		Data not Calculable		
CO	Max:		75	0.9	16
	Min:		Data not Calculable		
CO_2	Max:	146	1,080,000	12,900	145,000
	Min:	244	1,045,000	12,500	143,100
H_2O	Max:	131	317,000	3,800	104,500
	Min:	119	251,000	3,000	82,200

"Particulate emissions will decrease as loads decrease, but at something less than a direct proportion. SO_2 emissions are expected to decrease in direct proportion to load reduction. The SO_2 emissions listed above are based on an assumption that all of the sulphur in the coal is converted to SO_2. In fact, only the organic sulphur is oxidized and emitted as SO_2, while the sulphates remain in the ash, and the pyritic sulphur is largely discarded in the coal pulverizers and as bottom ash. Thus, actual SO_2 emissions will be less, and may be substantially less, than shown.

"Nitrogen oxide emissions decrease with load reduction due to lower peak flame temperatures. NO_x control provisions to be installed

in the furnaces by the Companies are expected to reduce nitrogen oxide emissions below those listed in the above tabulation.

"Carbon monoxide data has been taken from Public Health Service Publication No. 999-AP-35. Carbon dioxide and water vapor emissions are directly proportional to the amount of fuel consumed and are thus proportional to plant loads. Water vapor is also dependent on the humidity of the ambient air.

"Spectrochemical analysis of selected core samples indicated the absence of mercury and fluorine, but showed a trace of lead in some samples. Some ozone will be produced in the electrostatic precipitators, but is expected to be a very small amount."

c. Disbursement of Emissions

Most emissions are expected to drift to the east over the Continental Divide (the Great Divide Basin) because of stack height, the prevailing strong winds from the west, and the sub-micron size of particulates that escape the electric precipitators. There, differing portions of the emissions, depending upon local weather, are expected to mix into the Denver-Cheyenne-Casper regional airsheds. The ultimate fate of the emissions cannot be predicted with information currently available. They probably will add to other emissions resulting from combustion in the Denver-Casper area.

d. Effects Upon Visibility and Esthetics

One consequence of releasing stack gas emissions from fossil fuel combustion into the atmosphere is to reduce visibility and esthetic quality. The following information included in the Interior Department Environmental statement for the Huntington Canyon (Utah Power & Light) plant would have general application to the Jim Bridger plant:

"'The First Annual Report of the Council on Environmental Quality'[2] comments on visibility effects of air pollution to this effect:

" . . . Particulates, however, are the major villain in reducing visibility. Particles (ash, carbon, dust, and liquid particles) discharged directly to the air scatter and absorb light, reducing the contrast between objects and their backgrounds. Particles are also formed in the atmosphere by photochemical reactions and by the conversion of sulfur dioxide to sulfuric acid mist. Wherever sulfur pollution is significant -- which is wherever large amounts of coal and oil are burned -- visibility diminishes as relative humidity rises.

"The DHEW publication 'Air Quality Criteria for Particulate Matter,' 5/ states under the conditions set forth in the studies referenced therein that: '. . . With a typical rural concentration, such as 30 $\mu g/m^3$, the visibility is about 25 miles; for common urban concentrations, such as 100 $\mu g/m^3$ and 200 $\mu g/m^3$, the visibility would be 7.5 miles and 3.75 miles, respectively.'

"With respect to sulfur dioxide concentrations, the DHEW publication 'Air Quality Criteria for Sulfur Oxides' states that 'Visibility reduction to about 5 miles was observed at 285 $\mu g/m^3$ (0.10 p.p.m.). However, this does not appear to be a typical case. The following graph taken from the same publication probably gives the more typical results of SO_2 concentrations on visibility, and illustrates the effect of relative humidity which would be low at the site of the Huntington Canyon Plant:

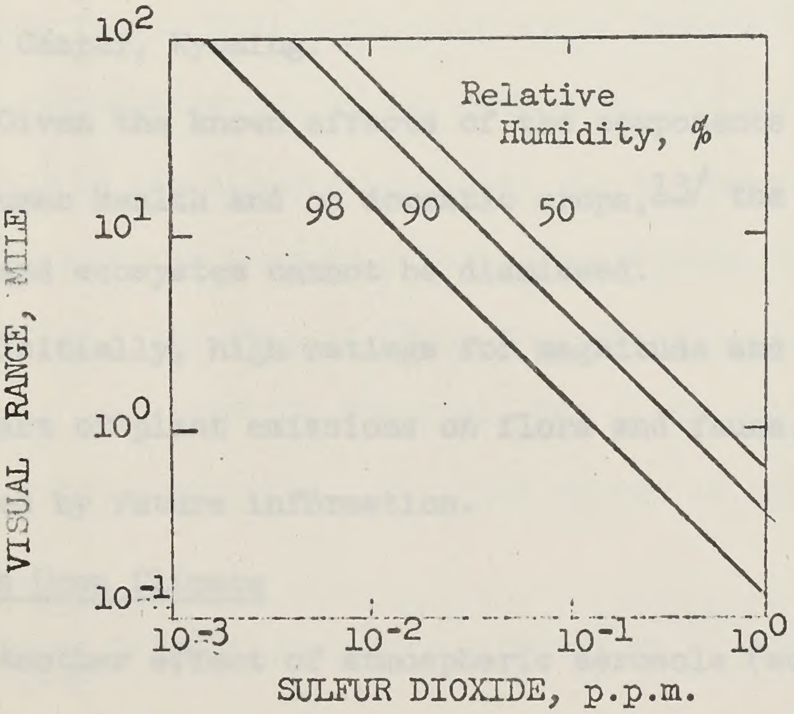

Fig. 1-5 Calculated Visibility (Visual Range) in Miles at Various Sulfur Dioxide Concentrations and at Different Relative Humidities in New York City."

As indicated above, visibility varies with particulate matter and relative humidity. If atmospheric moisture is constant, relative humidity will vary inversely with the temperature. Available data indicates Rock Springs experiences lower normal temperatures than New York throughout the year and lower relative humidity during the warm weather months. Since the effect of increased relative humidity is cumulative in diminishing visibility, the impact shown for New York City cannot be expected at the Jim Bridger site.

e. Effects Upon Range Ecology

Unfortunately, little is known about the effects of power plant emissions on rangeland ecology. The University of Utah is studying this in conjunction with proposed fossil fuel plants in Utah but to date has published no conclusions. A check with University of Wyoming sources revealed no research has been conducted on ecological effects of the Naughton Steam Electric Plant near Kemmerer, Wyoming or the Dave Johnston Plant near Casper, Wyoming.

Given the known effects of the components of power plant emissions on human health and on domestic crops,[13] the chance for damage to the rangeland ecosystem cannot be dismissed.

Initially, high ratings for magnitude and importance are assigned to the impact of plant emissions on flora and fauna. This will be modified, if warranted by future information.

f. Effects Upon Climate

Another effect of atmospheric aerosols (suspended particulates or other matter) is to reflect sunlight, thus reducing the amount of

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[13] See for example "The First Annual Report of the Council on Environmental Quality" and DHEW's Air Quality Criteria for sulfur oxides.

insolation that reaches the earth. Concerned scientists are stating that man-caused aerosols which are continuously being released into the atmosphere, added to those from natural sources such as volcanoes, are beginning to have sufficient cumulative effect that they have caused a slight lowering of average global temperatures. They speculate that a fourfold increase would trigger an ice age.[14/] Concern is also being expressed that particulates may "seed" storms and alter weather patterns, generally downwind from urban areas or other large source of atmospheric contaminants.

The carbon dioxide produced from all fossil fuel combustion has been accumulating in the atmosphere and in the seas. The total amount of CO_2 in the atmosphere has increased at least 10% since 1890. The amount released by the Jim Bridger plant will add a small increment in the global total. Atmospheric CO_2 causes a "greenhouse" or warming effect upon global climate. A projection of present global exponential increases in fossil fuel combustion would cause a further increase of 20-25% in atmospheric CO_2 by the year 2000. If not offset by other factors such as atmospheric aerosols, the increase is calculated to cause an increase in average global temperatures from 0.5 to 3^{o} F.[15/]

2. Generating Plant Impacts Other Than Emissions

a. Construction Material--The plant will require sand and gravel in large quantities. The only source of quality material is

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[14/] S. I. Rasool and S. H. Schneider, Atmospheric Carbon Dioxide and Aerosols: Effects of Large Increases on Global Climate. Science, July 1971.

[15/] B. Bolin, The Carbon Cycle, Scientific American, Sept. 1970. Also Mass. Inst. of Tech., Man's Impact Upon The Global Environment - A Study of Critical Environmental Problems, August 1970.

the bench land adjacent to the Green River. Removing and transporting the material will have a low impact, but it is important that conservation practices be employed because of the proximity to the river.

Surfacing material to hold down the dust at the construction site is readily available nearby; 100,000 cubic yards of scoria, a cinder-like material, have been used to date. This construction material was removed from the area proposed for strip mining.

b. Water Quality--A project of this magnitude offers two major threats to water quality. One occurs during the construction period when a large surface area is subject to erosion and the other involves disposal of liquid wastes.

Erosion and subsequent deposition of silt particles in live streams impact water quality by limiting its usability for irrigation, fisheries, etc. The impact of plant construction (including the railroad and access road) is deemed to be low both in magnitude and importance. This conclusion is reached after considering the plant's location eight miles from the nearest live stream, the low annual rainfall and the availability of conservation practices to control erosion during high intensity storms. The plant's location away from live water also reduces the likelihood of pollution from a malfunction of the sewage system serving the complex.

The closed cooling system proposed, whereby all water is either dissipated into the atmosphere or is recycled, would seem to preclude the possibility of surface water pollution from large quantities of water used in the cooling process.

The disposal of blowdown water highly charged with minerals by the process of cleaning the condensing mechanism offers a more serious

threat to surface water quality. This liquid effluent has the potential for killing aquatic life and surface vegetation. It could, if allowed to run off, reach the Green River and in time the Flaming Gorge Reservoir. The Companies propose to bury the blowdown residue along with bottom ash from the furnaces in the strip mine. The details and potential consequences of this proposal are unknowns. The opportunity for leaching of contaminants into the ground water system are greater if blowdown residue and fly ash are to be transported to the mine as a slurry using the blowdown water as a carrier, than would be the case if the waste materials were transported and deposited in a dry state.

There is no data currently available on the mineral or chemical content of the ash and residue from the generation plant, nor is there information on the depth, rate of movement or direction of flow of the ground water. However, there are two recorded wells in the area. A well at Point of Rocks, about six miles south of the plant has a recorded depth of 90 feet and 1000 PPM dissolved solids (mostly calcium sulphate). A second well which supplies water for the town of Superior is located two and one-half miles northwest of the plant. This well has a recorded depth of 1200 feet and 500 PPM dissolved solids.

Overburden returned to the mine pit is another source of dissolved solids if subjected to leaching by application of water in amounts greater than the 8 to 10 inches of rainfall normally received. Assuming that waste material will be deposited in a dry state and not in line with water bearing formations, leaching and subsequent percolation into the ground water would be slow. With adequate water added to leach the overburden and waste materials, sizeable amounts of contaminants might

conceivably reach the underground water system. The study team is not aware of any monitoring systems for movement of contaminants in the ground water from operations of this nature.

All effects on surface water were judged to have a low magnitude. The importance, however, was considered somewhat higher because of the serious consequences of water pollution should liquid effluents reach the Green River.

c. Atmosphere--The prevailing westerly winds can pick up dust particles from surfaces disturbed during construction, from uncovered tailings or from dried cooling and combustion process residues. The addition of particulates from these sources to the ambient air was judged to be of low magnitude. When considered as an addition to the adverse impact of the stack emissions, it gained somewhat in importance.

d. Land Use--Because of the site's low grazing capacity, changes in land use from grazing to industrial are insignificant at the 500-acre plant site. The plant will generate significant changes in residential and commercial land use at four locations -- the Point of Rocks interchange on I-80, Rock Springs, Green River, and the almost deserted town of South Superior. Because rapid growth without adequate land use and other planning usually results in environmental degradation, the planning efforts of each unit of government will be discussed.

By far the greatest impact is expected in the town of Rock Springs (pop. 11,490). In July 1970, the town hired Midwest Planning and Research to prepare a comprehensive plan. The federally aided

planning contract calls for a comprehensive land use plan covering housing, transportation, sewage, etc., and preparation of a zoning ordinance and subdivision standards. The results of the planning effort are due in August of this year.

The town of Green River (1970 pop. 4,196) will also feel the impact of growth generated by the plant. Green River is presently awaiting completion of a master plan prepared by Wyoming Department of Economic Planning and Development.

South Superior (pop. about 200) does not have a sewage system. Its other facilities are capable of handling no more than a few short-term residents.[16] Some growth, especially during the construction period, can be predicted for Point of Rocks, the exit to the plant from I-80. Sweetwater County has an appointed planning commission that advises the county commissioners. The County has spot-zoned several small areas as needs became evident. It has the authority to assist unincorporated towns with planning and zoning.

The major impact will be on housing, transportation and schools. Preliminary information from the Rock Springs planning consultant indicates a heavy impact on all three from 1971 to 1975. All sources indicate some problems in accommodating the construction forces; the permanent work force can be absorbed without too much difficulty.

The following table graphically portrays the expected construction force buildup:

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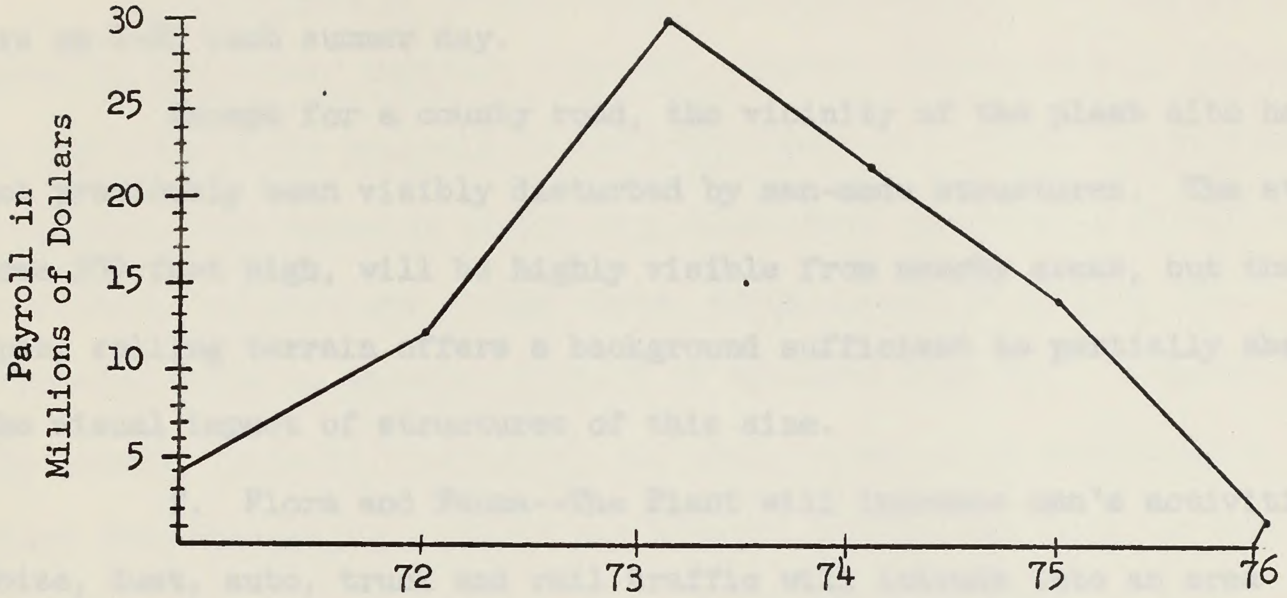
[16] See Idaho Power Co. and Pacific Power & Light Co. Environmental Impact Study Report Supplement No. 2, July 1971 (letter of May 13, 1970).



Construction "Boom" as Indicated by Payroll[17]

Land is available for mobile home parks to accommodate the construction crews. Several are now under construction in or near Rock Springs. This will continue a present trend that has seen the number of mobile homes in Sweetwater County more than double in the 1960-1970 decade.[18] With proper planning and zoning, land can be obtained from the public domain managed by the Bureau of Land Mangement for residential and commercial uses.

With a construction peak in 1973-1974 and planning only partially complete, moderate adverse impacts on land use and population density can be predicted.

e. Scenic Views and Vistas and Wilderness - Open Space Qualities--The top of the Plant's smoke stacks, a 230 KV tap line, the railroad

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[17] See Idaho Power Co. and Pacific Power & Light Co. Environmental Impact Study Report Supplement No. 2, July 1971.

[18] Information obtained from Wyoming Department of Economic Planning and Development.

and the access road will to some degree be visible to about 18,000 travelers on I-80 each summer day.

Except for a county road, the vicinity of the plant site had not previously been visibly disturbed by man-made structures. The stacks, some 500 feet high, will be highly visible from nearby areas, but the open, rolling terrain offers a background sufficient to partially absorb the visual impact of structures of this size.

f. Flora and Fauna--The Plant will increase man's activities. Noise, dust, auto, truck and rail traffic will intrude into an area previously free of regular disturbance. Allowing a one-half mile wide zone of disturbance alongside the railroad and access road, and allowing 640 acres for the plant, about 4500 acres will be affected. Bureau of Land Management wildlife biologists estimate fewer than 100 sage grouse and an occasional antelope would be disturbed.

g. Archeological and Historic Values--Additional cultural factors include the potential effects on historic and archeological values. Through a contract with the University of Wyoming Department of Archeology, a survey program of construction sites has been undertaken by the Companies. Opportunities to salvage any archeological information prior to construction will be allowed. The old county road past the plant site evidently obliterated all evidence of an old stage road leading north to South Pass, Wyoming. This is the only known historic value in the area.

A study of historic and archeological values on public lands in Idaho has been provided for in a contract between Idaho Power Company and Idaho State University. The provisions of this contract are similar to that consumated by Pacific Power & Light Company in Wyoming.

B. TRANSMISSION LINES

The impact of transmission line construction and operation relates to the linear corridor affected. Adverse impacts can be reduced by intensive route analysis on specific locations. Since the earliest proposals, land managing agency objections have resulted in significant relocations of portions of the route, as discussed in Section VII, "Measures Taken to Enhance, Protect or Mitigate Impacts." Although the general route is identified, the exact location of transmission lines from Montpelier to Borah and Kinport Substations have not been determined since construction of the first of these lines is not scheduled to start until March 1973. Precise location must be based on a cooperatively undertaken route analysis to avoid unnecessary adverse impact.

1. Soil Erosion and Deposition

Adverse impacts of soil erosion and deposition have been identified with regard to the road and trail system required to construct and maintain the approximately 750 linear miles of powerlines. Removal of natural vegetation and modification of landscape tend to concentrate natural runoff in the roadway, thereby accelerating erosion. While these soils do not typically have a high productivity in the agricultural sense, serious erosion represents a permanent loss of the resource base. Present and future generations would lose the potential of the affected site for grazing, wildlife habitat, recreation and efficient function of the hydrologic cycle.

The importance of this impact is rated moderate. Adverse effects can be reduced by implementing comprehensive erosion prevention and site rehabilitation measures during all stages of road system planning, construction and operation. Specific areas of high concern are:

1. Arid, erodible soils where revegetation is difficult (principally Wyoming).
2. Roads and trails crossing natural drainages (throughout entire route).
3. Construction and use of roads and trails in steep, broken topography (various sections west of Kemmerer through Idaho).

2. Flora and Fauna

Vegetation will be removed or disturbed on tower construction sites, roads and trails, and on certain R/W sections to achieve necessary clearance for lines.

Wildlife will be disturbed and temporarily displaced during periods of actual construction. Improved access to big game winter-use areas may be detrimental because of increased traffic disturbing the game populations. Harassment of game by snow machine users is a critical impact likely to occur. The magnitude is small but very important because of the serious impact on a big game herd. Proposed transmission lines traverse approximately 75 miles of big game winter habitat area.

Counteracting this adverse impact is the beneficial effect of vegetative change in forested areas from the standpoint of big game habitat. Clearing of a timber overstory will generally result in increases of shrubs, forbs and grasses which are highly desirable for

wildlife forage. It will also increase the "edge effect" - available browse, with timber nearby for cover. The overall impact on flora and fauna is rated slight; however, impacts such as that of traffic on big game must be considered critical and resolved if they occur.

3. Land Use

The right-of-way for the transmission line will encompass approximately 14,000 acres. It will restrict other space-occupying uses such as buildings, etc., on this acreage, but traditional uses such as grazing domestic livestock and wildlife can continue on all but the fraction of the right-of-way needed for towers and roads. A small amount of agricultural land, in relation to the total land area within the right-of-way, is crossed. In Wyoming, the line crosses irrigated hay meadows and pastures in the valleys of Hams Fork River, Bear River and Meadow Creek. In Idaho, the single line crosses or skirts the edge of some dryland wheat farms from Montpelier to Goshen substation. The two circuits from the Montpelier divergent point to the Borah substation cross 25 to 35 miles of agricultural land at four locations. The line is expected to have a moderate adverse impact on the agricultural land uses because of inconvenience to farming operations and the constraints the lines and towers would pose for sprinkler irrigation systems.

Other industrial development along the route (primarily mineral development) will be beneficially affected by the increased availability of power.

4. Scenic Views and Vistas

Adverse impacts by the powerlines and associated roads on scenic views can be expected. Approximately 180 miles of prairie or rolling hills with long vistas will be affected in Wyoming and Idaho. The low-growing vegetation in these areas does not provide screening potential to reduce visual impacts. West of Kemmerer, Wyoming, the lines traverse approximately 150 miles of valley-mountain areas which have a high inherent scenic value because of diversity in land form, vegetation and water. Numerous transportation routes will be crossed by the lines and, in some cases, views of the traveling public will be adversely affected. The line crosses three major highway routes that carry traffic toward Yellowstone National Park. These are Wyoming State highways 187 and 189 and U.S. highway 30N. Average summer traffic loads on these routes are 880, 570 and 1090 cars per day, respectively.

Some semi-wilderness qualities exist, primarily in the Northern Desert-Salt Desert Shrub area of Wyoming, and Montane Forest vegetative types in Idaho (See land form-ecology illustration in Existing Environment Section). Transmission lines and roads are a man-made feature foreign to the natural landscape. Adverse effects will be moderate considering present land uses and the relative quality of scenery in the area.

Historical and archeological sites and artifacts are common throughout the area. The possibility of damage is limited but any values destroyed are irreplaceable. The adverse effect is, therefore, judged to be significant.

C. WATER SUPPLY SYSTEM

The following environmental characteristics will be affected by the water supply system:

1. Water Quality and Quantity

Approximately 30,000 acre feet of water per year will be pumped out of the Green River below Fontenelle Reservoir. Withdrawal of this water may affect downstream water uses since the water being diverted will not be available to dilute downstream salt accumulations. Drawing on information in the Colorado River Basin studies biennial Progress Report No. 5, Quality of Water, published in January 1971, the Green River at Green River, Wyoming, is shown to have a long term (1941 through 1968) average flow of 1.3 million acre feet per year. Dissolved solids at this point are about 307 parts per million. The Colorado River downstream at Hoover Dam has a projected average flow of 8.3 million acre feet in the future. Concentrations of dissolved solids at this point have averaged 700 PPM. On this basis, withdrawing 30,000 acre feet at Green River would have the effect of reducing average flows at Hoover Dam to 8.27 million acre feet and increasing salinity concentrations from 700 PPM to 701.4 PPM or about two-tenths of one percent.

2. Soil Erosion and Deposition

Pipeline and road construction will result in the removal of vegetative cover on a corridor approximately 50 feet wide and 42 miles long. About five miles of the pipeline traverse highly erodible soils of 20% or greater slope. Numerous side drainages are also crossed at nearly right angles. The erosion hazard is high during and following

construction until a vegetative cover is reestablished. A leak or rupture in the pipeline, although not at all likely, would cause serious washing and possible damage from deposition. The magnitude and importance of total impact is rated moderate to high because of (1) the 250 acres affected, (2) the presence of physical characteristics which tend to accelerate the erosion process, and (3) the difficulty anticipated in revegetation of disturbed areas because of low fertility soils and arid climate.

3. Flora and Fauna

Shrubs and Grass--Vegetation in the pipeline right-of-way construction corridor would be destroyed. Rehabilitation efforts plus natural healing may revegetate this area except for access and maintenance roads. The dam and impoundment at the surge pond site will inundate 80 acres which at present has a scant cover of shrubs and grass. The importance of this impact is rated low.

Aquatic Plants--Growth of aquatic plant life in the proposed surge pond could be beneficial to a fishery or to waterfowl populations. The beneficial impact is rated slight because the quality of the water and future uses for fisheries, etc., are unknown.

Other Animals--The surge pond would provide a permanent water supply beneficial to all wildlife in the area. The impact is rated high in importance because of the present lack of water supplies in the immediate area.

4. Scenic Views and Wilderness - Open Space Qualities

The proposed pumping plant and power supply line would be located in an area substantially developed and congested with man-made

facilities which adversely affect aesthetics (railroad, highways, substations, powerlines, etc.).

The pipeline (to be buried) and associated roadway will adversely affect scenic quality. The 50-foot construction scar will span the entire 42 miles from Green River to the project site. Due to poor soils and arid climate, revegetation of disturbed areas will be slow unless intensive effort is directed to rehabilitation.

The area of highest scenic impact is the east face of White Mountain which is a moderately important scenic backdrop for the Green River-Rock Springs area. The mountain face and two mile scar resulting from construction would be visible to certain residents of the area and even more people using Interstate 80, U. S. 187, and several lesser highways. Because the scar would degrade this area within view of a large general public, the impact is rated high in importance.

The proposed surge pond will introduce an element of diversity into a landscape which is somewhat monotonous. The impact is rated a moderate benefit because of general improvement to existing landscape in the plant site area.

5. Other

Construction of the powerline, pumping plant, pipeline and surge pond will generate some temporary employment in the area. Permanent jobs and lasting effects on the economy will be minor. The beneficial impact of jobs created is partially offset by the demands a "construction boom" places on the existing public facilities and services, such as the area school systems. Long-term beneficial impact is rated slight in importance.

The 230 KV transmission line to service the pumping plant is of adequate capacity to serve additional power needs in the town of Green River. Pacific Power & Light Company has indicated that this line will be used to stabilize the present power supply.

D. COAL MINE OPERATION

The following environmental characteristics will be affected by the coal mine operations.

1. Soil Erosion and Deposition

The coal mining operation will disturb an average of about 125 acres of the surface annually. Haul roads will be three to seven miles long. Topsoil and overburden stripped from the mined area will be susceptible to wind erosion between the time it is removed and the time it is replaced as part of the rehabilitation of the mined area. The imposed Federal and State rehabilitation requirements should make the time period of soil vulnerability to wind erosion temporary in nature, thereby minimizing the erosion impact. Erosion will be confined to the site and to the haul roads, with wind deposition of large particles within 2-3 miles. Wind erosion will also add particulate matter to the ambient air which will drift much further.

2. Water

Tests to date indicate that the mine operations are not expected to encounter underground water. No surface water sources are present in the mining area. Because of the low precipitation, the impact on water will be slight due to the distance to live streams and major water courses. Thus, a low importance rating is accorded.

3. Atmosphere

The primary impact of the mining operation will be on atmospheric quality. Soil disturbance from the mining operation and the haul roads are subject to the prevailing westerly high winds and will add a continuous

source of dust to the air. Winds average 12 miles per hour year-round. "Strong winds of 20 to 40 mph with higher gusts will prevail for a few days..."[19] In order to physically accommodate the heavy ore trucks, the haul roads will have to be surfaced, minimizing dust from this source. The mining operation is expected to have a low to moderate impact on the area's atmosphere.

4. Flora and Fauna

A slight impact is expected on birds, wild animals and domestic livestock in the immediate area of mining activity. Short-term displacements will occur. Revegetation requirements provided for in Federal stipulations of Title 23, CFR, and State imposed reclamation standards for mined areas under the Wyoming Open Cut Land Reclamation Act (Chapter 192, Session Laws of Wyoming, 1969) should offset detrimental impacts. It is noted, however, that the existing coal leases were issued prior to the effective date of the Title 23 regulations.

Rules and regulations promulgated under the State Act provide reclamation and bonding requirements. A plan of reclamation may be submitted to the Commissioner of Public Lands for his acceptance. Annual reports, accompanied by maps, indicating measures taken to effect reclamation of the affected land are required. The State law applies to public lands of all Government agencies unless the agency regulations are equal to or greater than those imposed by the Act.

19/ State Engineer's Office, Wyoming Water Planning Program Report No. 3, Water & Related Land Resources of the Green River Basin, Wyoming. September 1970.

5. Scenic Views

During coal mining operations and pending reclamation of the area, the scenic value and the natural landscape of the site will be impacted. Over the life of the project about 5,000 acres will be disturbed. The mine area is not visible from great distances (generally less than a mile) and will have impact on the scenery of slight magnitude and importance.

6. Other

Economy--The area's economy is based primarily on mining, ranching and railroad services. The additional mine operation will not change cultural patterns of this area. It is expected that the mine operation will provide in excess of 100 additional permanent employees to the area. This is a moderate increase in relation to the size of the local labor force. It is of high importance because they will be permanent employees.

Interpretive-Educational--The type of coal mine operation and other plant facilities provide the opportunity for interpretive and educational tours for local residents and tourists.

E. CUMULATIVE IMPACTS

While a project of this size must be separated into components to facilitate analysis, this approach can result in missing potential total impacts. There is also the possibility of a synergistic effect developing from a combination of effects working together that would increase the total impact.

The wind-borne soil particles from the mining operation will add a predictable, but at present unquantifiable, amount to the particulates from the stack emissions. All of the project components have a potential of causing soil erosion. The linear nature of the project -- 750 miles of transmission lines, 42 miles of pipeline, and seven miles of railroad and access road -- diffuse the impact over a broad area.

Synergistic combinations might occur in the activities associated with the mine and generating plant. This possibility will be explored as the analysis of the emissions continues.

F. ACCIDENTS AND CATASTROPHES

The strip mine would present the possibility of injury or death from vehicle or equipment accidents, from falling materials and unexpected slides within the strip areas, and from the use of explosives within the strip pits. If the public is invited to view the mining operation, injuries could occur from falls from overlook areas.

Transmission line or tower failure would pose a serious hazard in the right-of-way area. Records indicate the number of wild fires being caused from broken powerlines is very small; therefore, the threat from fire is not considered significant. The possibility of animals coming in contact with a broken line is also considered to be very remote. The primary possibility of human contact would occur where the lines cross the public roads. There are five highways crossed by the transmission system. Summer traffic is heavy on these highways with tourists going to and from Yellowstone Park. Past incidents of accident or death occurring from existing powerlines does not indicate that the proposed line would create any significant hazard. Due to the distance between transmission line conductors, there is little or no hazard to large birds perching on the towers.

G. UNKNOWN OR PARTIALLY UNDERSTOOD IMPACTS

The preceding impact summary reveals two areas where continued research and monitoring is needed before the impacts can be fully understood. The first involves the effect of the stack emissions on regional air quality. The second includes the total effects of the plant on rangeland ecology.

The Companies have hired Dr. W. L. Faith and Western Scientific Services, Inc., after consultation with Wyoming Air Resources Council, to design and conduct their air quality surveillance program. The Environmental Protection Agency has reviewed the proposed monitoring program. See the letter in Section XI for their comments. Monitoring of meteorology and air quality has been underway for some time.

The Companies are in the process of contracting for an ecological inventory and a monitoring study by the University of Wyoming. The Bureau of Land Management and Wyoming Game and Fish Commission will be given an opportunity to comment on the study and will be kept informed of progress.[20/]

[20/] Telephone conversation with Dr. Morton May, Plant Science Division, University of Wyoming

VII. Measures Taken to Enhance, Protect or Mitigate Impacts

A. TRANSMISSION LINE LOCATIONS

The initial right-of-way location involved numerous on-the-ground inspections with U. S. Forest Service, Bureau of Reclamation, Bureau of Sport Fisheries and Wildlife, U. S. Soil Conservation Service, Bureau of Indian Affairs, and Bureau of Land Management personnel. Progressing from the proposed plant site in a westerly direction, the following route changes or relocations were incorporated into the Companies' right-of-way request:

1. The Bureau of Land Management requested a right-of-way relocation 2½ miles to the south of the Companies' proposed Highway 187 crossing north of Rock Springs. This action would now place the crossing at the 14-Mile Hill area (14 miles north of Rock Springs). The proposed powerline crossing would utilize a natural cut or pass through the White Mountain Range, thereby eliminating any skylining problems that would otherwise be encountered anywhere within a 2 or 3 mile radius.

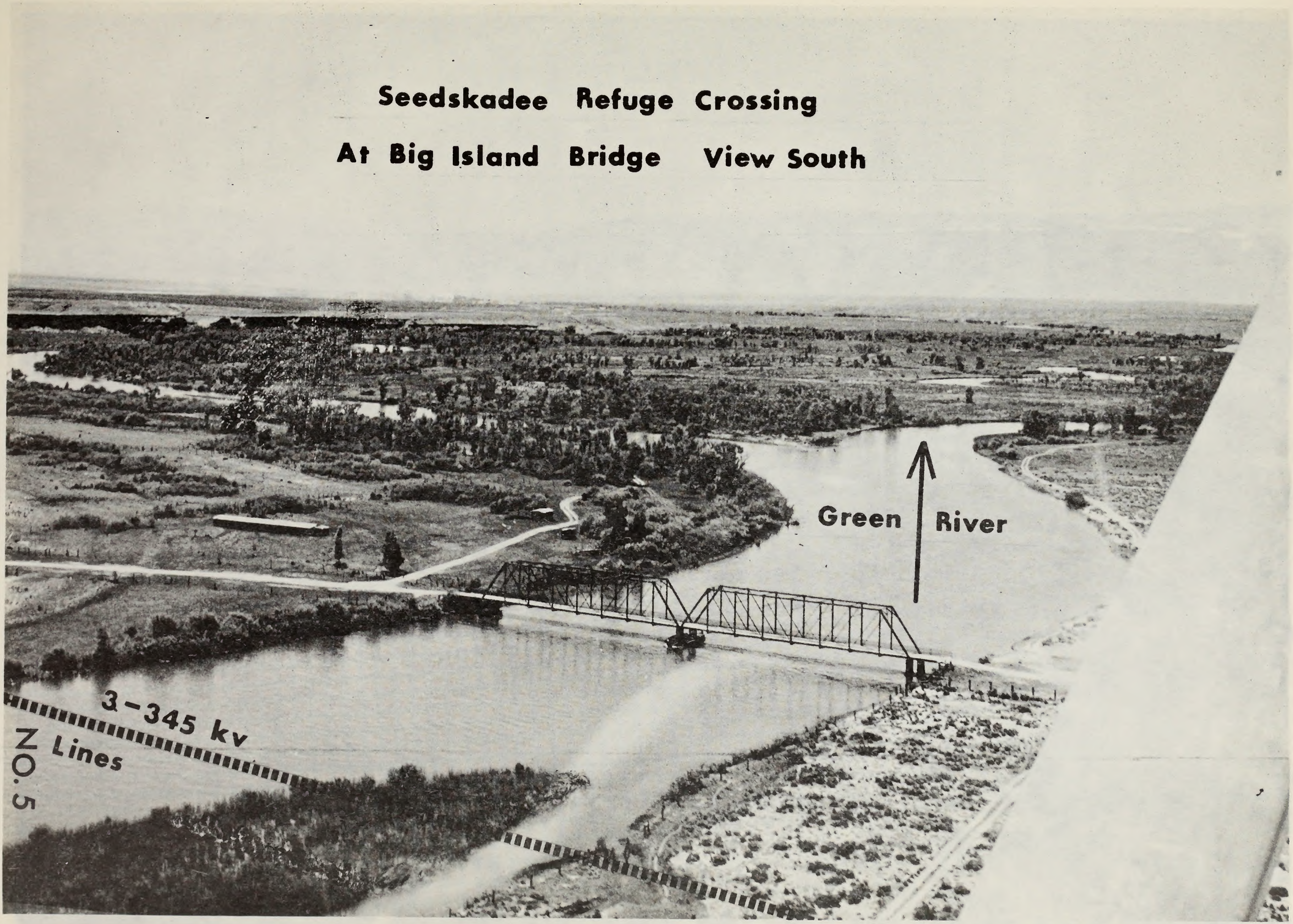
2. The Bureau of Sport Fisheries and Wildlife requested a right-of-way relocation several miles downstream of the Companies' proposed crossing of the Green River and Seedskadee National Wildlife Refuge. The crossing as originally proposed would have dissected a prime waterfowl habitat development area in the heart of the refuge, and interfered with wilderness qualities found upstream. The powerline crossing as now contemplated would cross immediately to the north of the Big Island bridge and would span the body of water at approximately the same height as the bridge superstructure. The proposed height of the powerline would not

present a menace to waterfowl since the birds in flight would be rising to clear the very noticeable bridge structure. The proposed crossing is also at a narrow point of the refuge which is not planned for waterfowl nesting developments. From the planned visitor overlook to be located on the eastern bluffs of the Green River overlooking Big Island, the transmission lines would not be visible, nor would they be visible from the proposed picnic and use areas to be situated on Big Island proper. See photo No. 5 on next page.

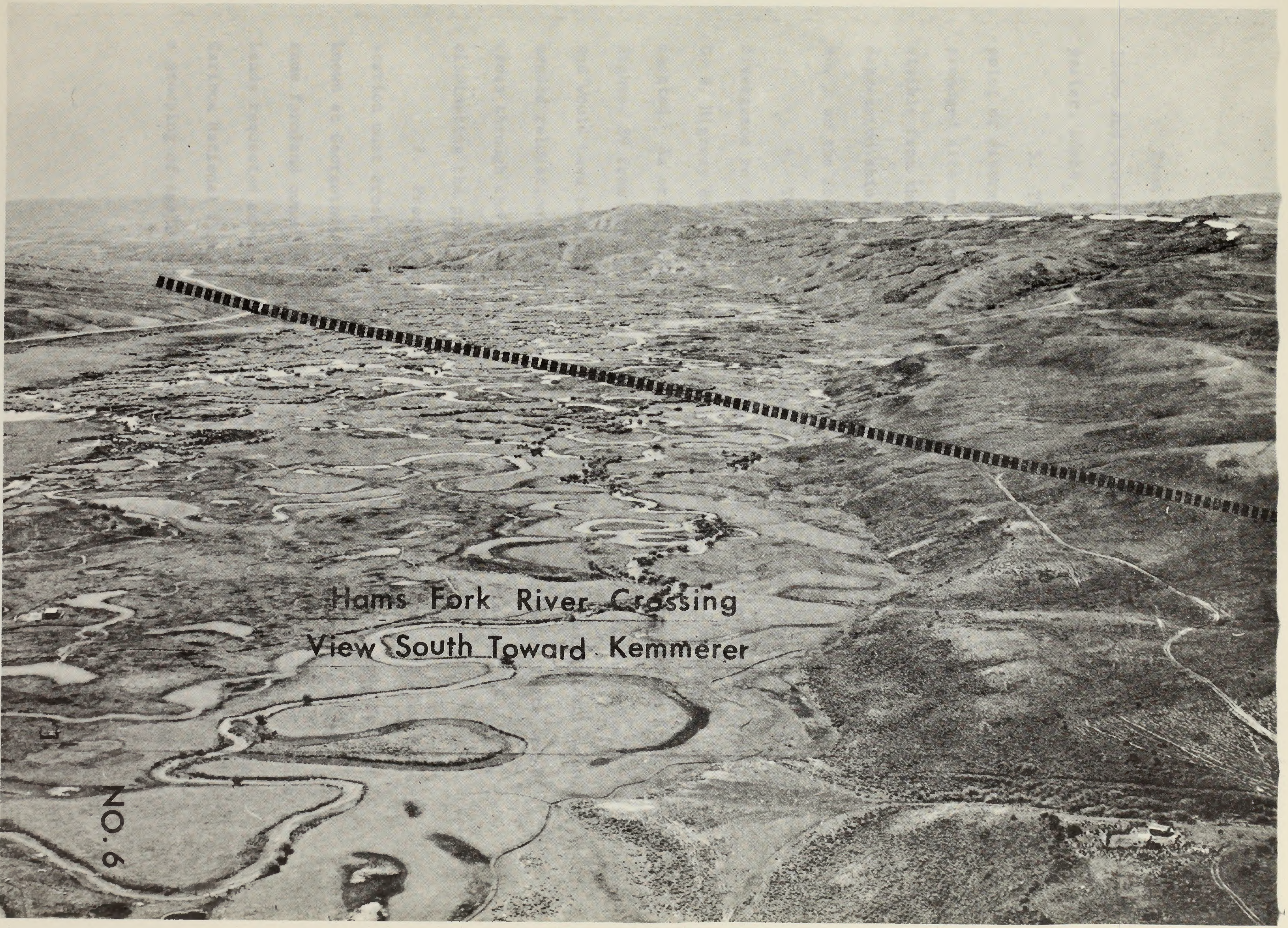
3. The U. S. Soil Conservation Service requested a route change from the Companies' originally proposed crossing of the Hams Fork River, north of Kemmerer, Wyoming. The Companies' original proposals would have dissected the proposed Upper Hams Fork reservoir, a PL-566 project. The new alignment has been shifted 2½ miles to the north which avoids the proposed dam site and high water line and still avoids direct impact with the existing Kemmerer and Viva Naughton Reservoirs. The reservoirs are nearby, but the lines will be out of sight from these heavily fished water bodies. See photo No. 6.

4. The Bureau of Land Management worked closely with the power companies in locating the transmission line corridor from the Hams Fork River to the townsite of Cokeville, Wyoming, to avoid paralleling or disturbing the historic Sublette Cutoff of the Oregon Trail and any associated historical sites. These historical sites include, but are not limited to, the Nancy Hill Grave and Emigrant Graves sites, Emigrant Spring and Rough Lock Hill. In addition, this geographical area receives moderately high recreational use at this time and has a potential for much greater use in the future. Proper right-of-way alignment in this region of the State is of the utmost importance and concern.

Seedskadee Refuge Crossing
At Big Island Bridge View South



NO. 5



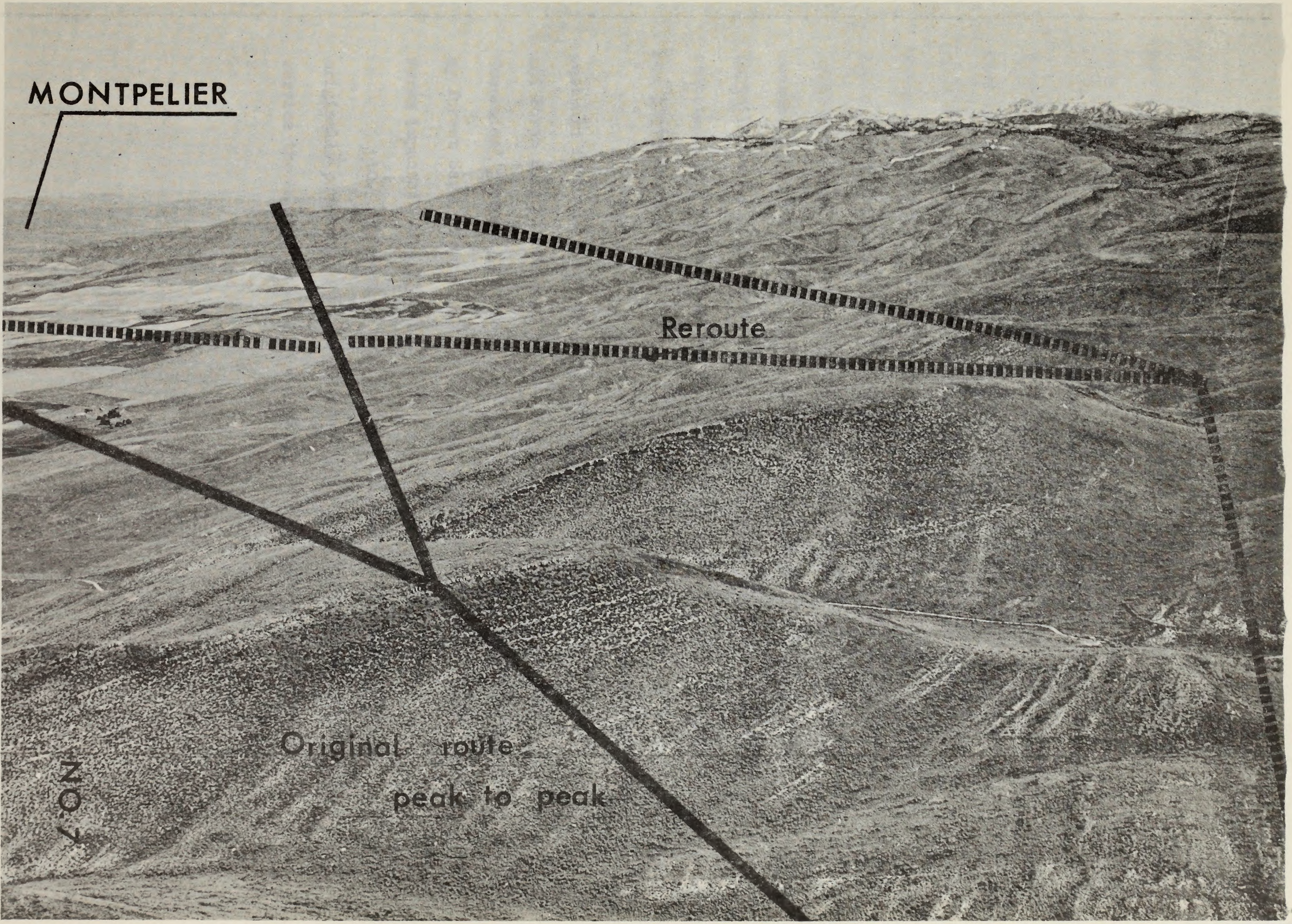
NO. 6

From Cokeville, Wyoming, the three 345 KV transmission lines enter Idaho and proceed to their point of divergence located northeast of Montpelier, Idaho.

5. The Bureau of Land Management recommended relocation of the point of divergence about one-quarter mile east and north of the originally proposed site on top of a prominent ridge where the towers would have been visible from the town of Montpelier. The selected spot is in a valley depression shielded from view by surrounding ridges and hilltops. Photo No. 7 on the following page illustrates the reroute.

6. The single 345 KV line running northward from the point of divergence to the Goshen Substation must cross Montpelier Canyon in which U. S. Highway 89 connecting Montpelier, Idaho and Afton, Wyoming is located. As originally proposed, the line crossed the Canyon and U. S. Highway 89 from high point to high point on either side of the valley and would have been highly visible. The Bureau of Land Management recommended relocation of the line a quarter mile eastward so the route would cross through the low swales of the ridges on either side of the valley, eliminating the prominence of the structure and conductors.

7. Proceeding northward, the transmission line to Goshen Substation must cross a prominent ridge between Georgetown and Soda Springs, known as Georgetown Summit. In this area, the proposed route crossed some farmland owned by the State of Idaho. The Idaho Department of Public Lands requested moving the line eastward to non-agricultural land of the Caribou National Forest. On the National Forest lands in that area is a grouping of small pothole-type ponds known as Swan Lakes. The route



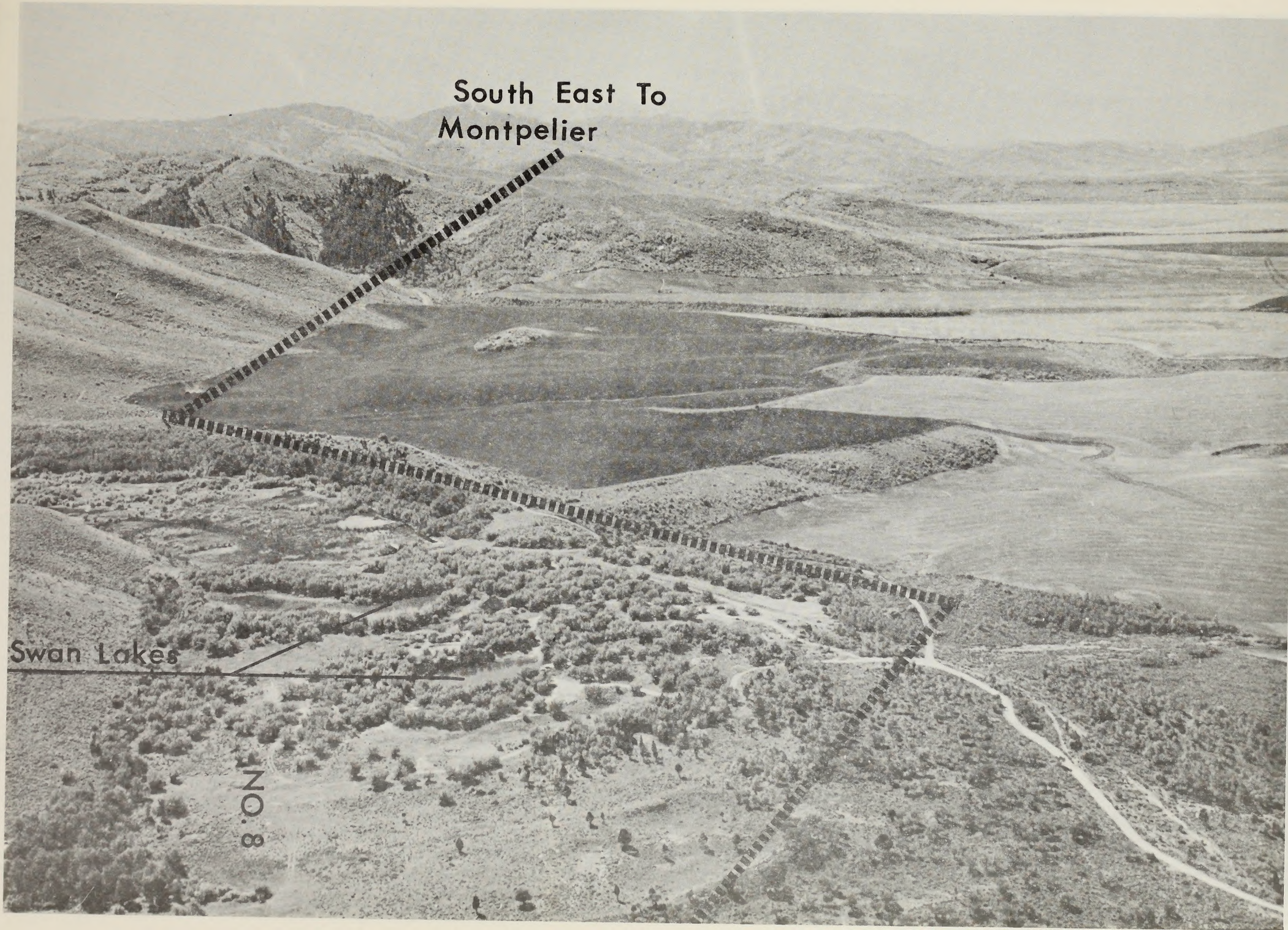
NO.7

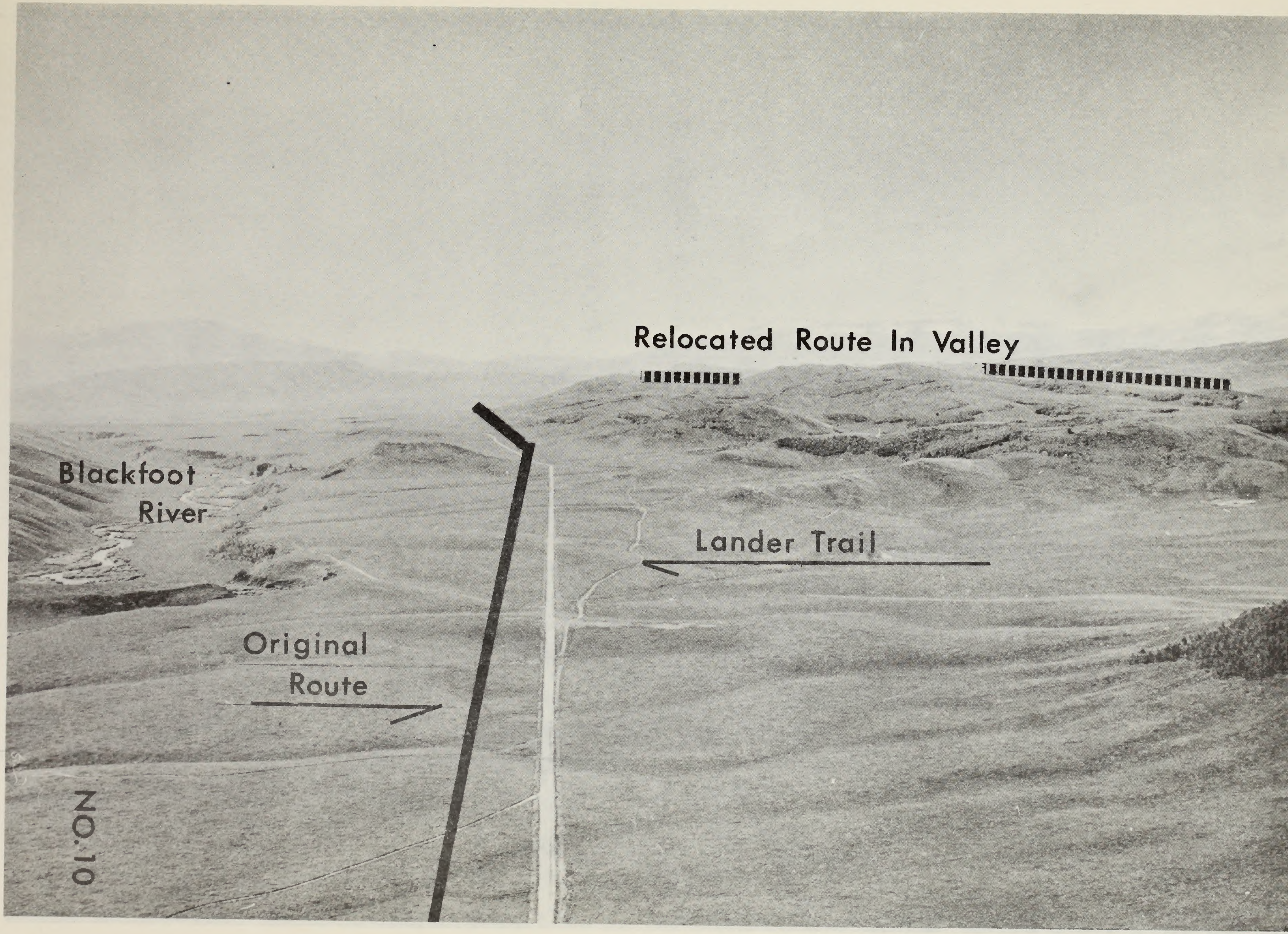
now selected lies adjacent to the National Forest boundary and avoids passing directly over the Swan Lakes Complex. See photo No. 8 on the next page.

8. North of Soda Springs the Goshen Substation route as selected parallels a county road along the Blackfoot River. This county road utilizes portions of the historic Lander Trail. Those portions of the Lander Trail over which the county road has not been constructed are clearly visible. In addition, this area has considerable recreational use with a potential for greater utilization. The route as originally proposed was incompatible with the scenic, historical and recreation values of the area. An alternative route through the low foothills and a long valley about 1½ to 2 miles west of the originally selected route has been agreed on by the Companies as a line location. See photo No. 10.

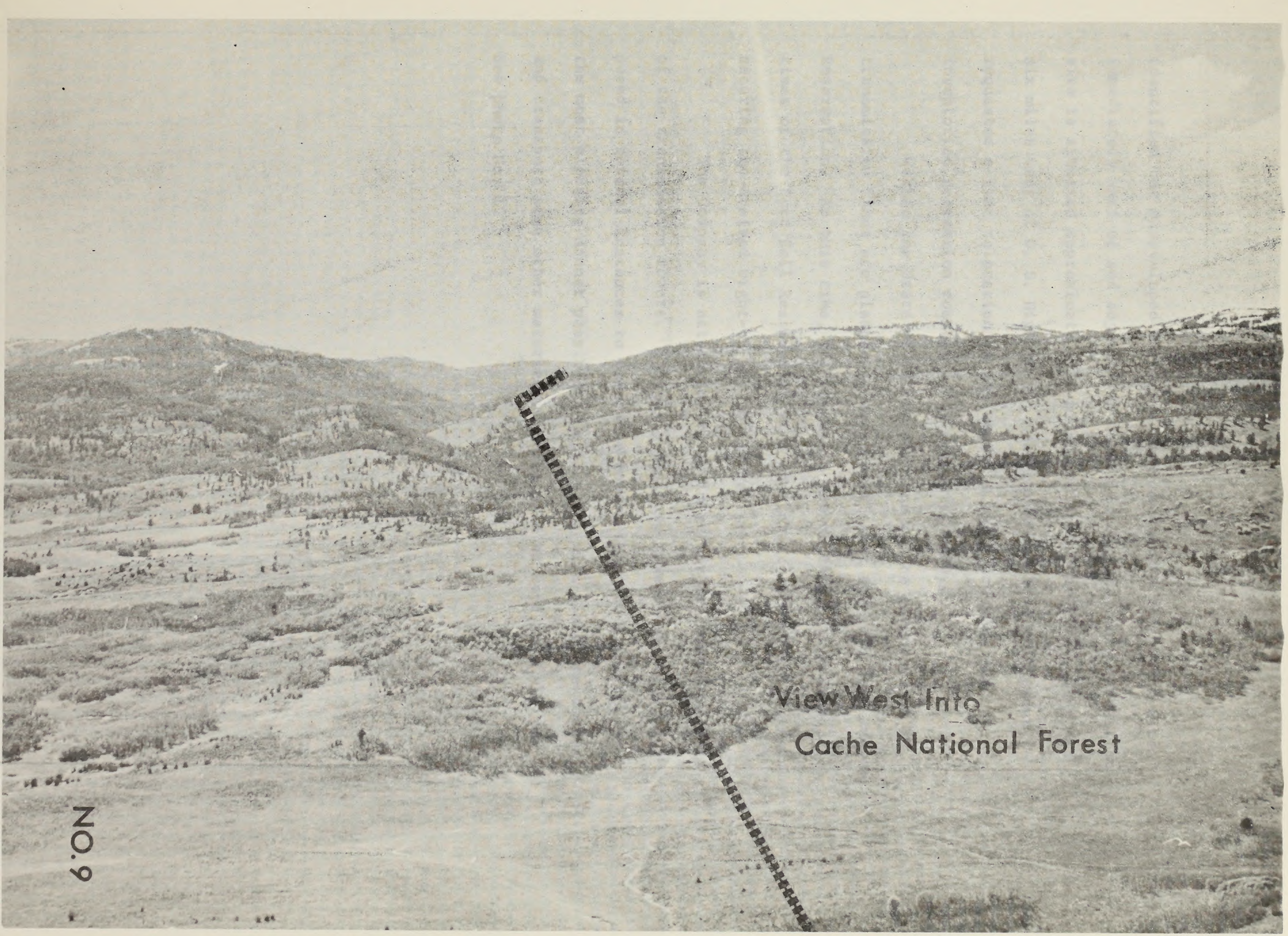
9. The route of the two combined 345 KV circuits running westward from the point of divergence at Montpelier to the Kinport and Borah Substations must cross the Cache National Forest. The Companies' proposal and alternative line locations are being evaluated by Forest Service personnel to identify opportunities to mitigate adverse impacts. See photo No. 9.

10. Proceeding in a westerly direction, the Companies' originally proposed route for the two combined 345 KV lines, which will service the Kinport and Borah Substations would have crossed over an


South East To Montpelier
Swan Lakes
NO. 8


Relocated Route In Valley
Blackfoot River
Lander Trail
Original Route

NO.10



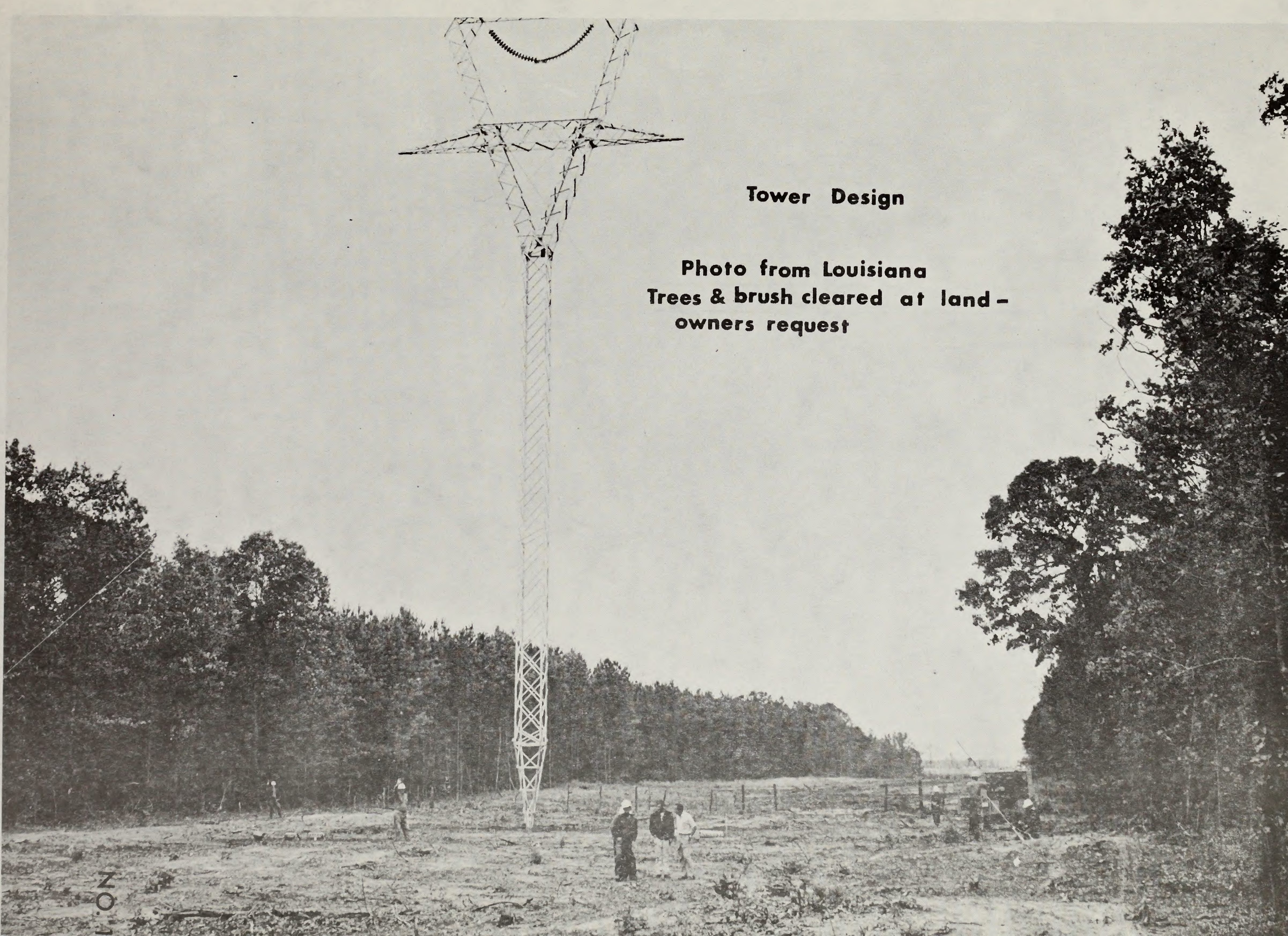
View West Into
Cache National Forest

NO. 9

identified but undeveloped Bureau of Land Management recreation site immediately west of and adjacent to Garden Creek Gap. This recreation site is situated approximately 20 miles south of Pocatello, Idaho and six miles west of U. S. Highway 91. The Bureau of Land Management requested a line relocation to the south to avoid crossing the inventoried recreation complex. The Companies agreed.

Within the State of Idaho, portions of the proposed 345 KV transmission lines are planned to cross or dissect the Fort Hall Indian Reservation. At this time, the Companies are meeting with representatives of the Fort Hall Reservation with the intent of negotiating and securing the desired right-of-way corridors.

The Company is attempting to minimize adverse visual impacts of the transmission towers. Specially designed towers are being proposed in several instances to blend the towers into the landscape in the most pleasing manner possible. Helicopters will place the towers, and transport some other materials. Roads will be kept to a minimum. See photo No. 1.



Tower Design

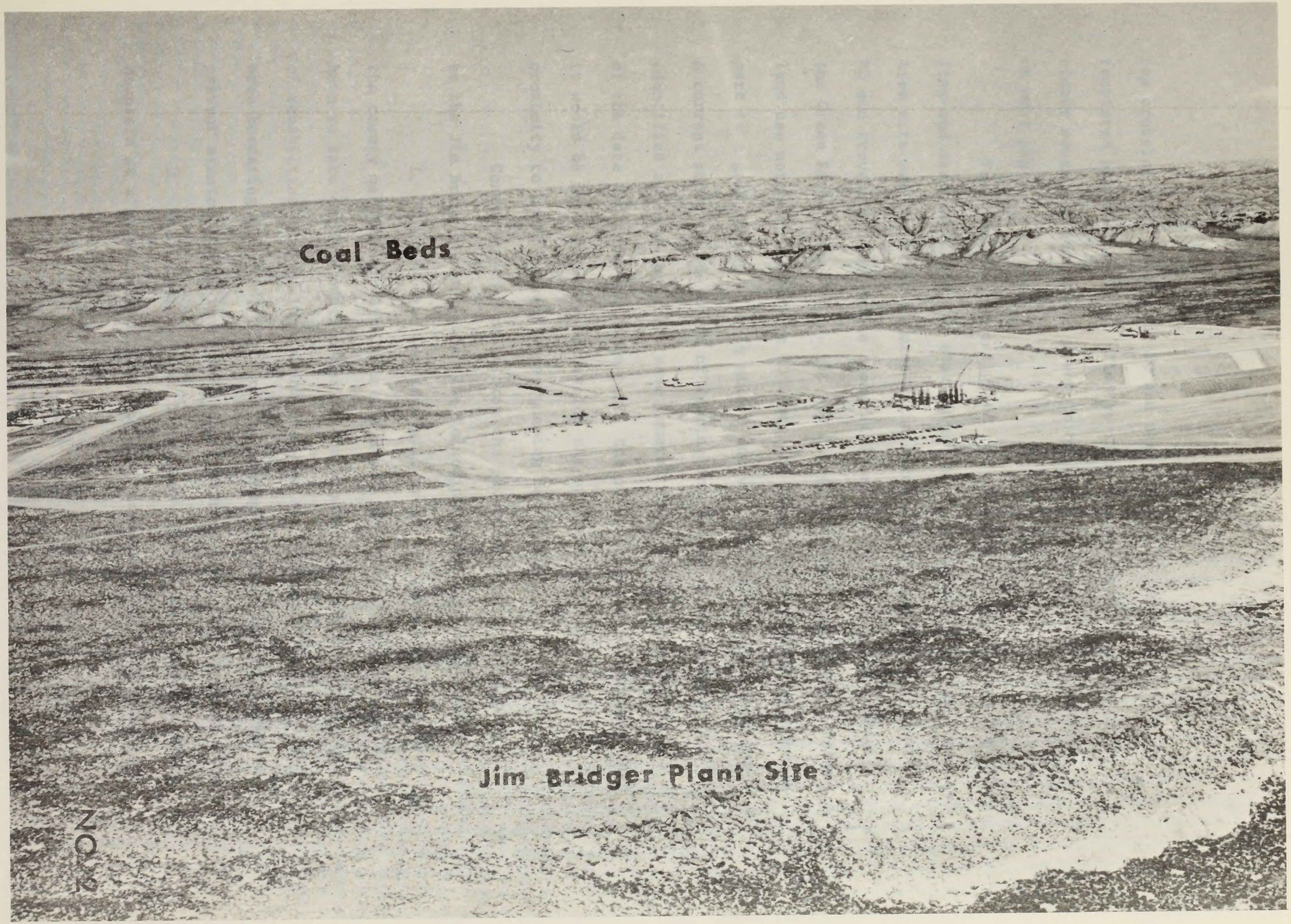
Photo from Louisiana
Trees & brush cleared at land-
owners request

VII. Measures Taken to Enhance, Protect or Mitigate Impacts

B. WATER PIPELINE AND SURGE POND LOCATION

The location of the plant site had the effect of establishing the terminus of the water pipeline and the general location of the surge pond complex. Field examination by the Bureau of Land Management and power company personnel indicates two excellent surge pond sites adjoining the power plant site. One is located in Section 36, T. 21 N., R. 101 W., immediately north of the plant site, while the other is located within the N½ of Section 10, T. 20 N., R. 101 W., just to the south. Topographic relief maps and site examination indicate that the lands in Section 10 would permit a deeper surge pond utilizing a proportionately smaller land surface area. This proposed site would reduce surface evaporation to a large extent compared with the site in Section 36 and would also permit the development of more suitable fish habitat if the plan-design would permit use of the water for this purpose. The lands within the N½ of Section 10 are deemed most feasible and appropriate for a surge pond site. See photo No. 2 on the next page.

The power companies propose to locate the inlet structure and pumping station within the city limits of the town of Green River adjacent to their present pumping facility, which at the present time provides domestic water for both Green River and Rock Springs. This proposal would require crossing Interstate 80 with the water pipeline via the White Mountain Road Underpass, and thence proceeding overland in an easterly direction a distance of 42 miles toward the Jim Bridger Project plant site. The proposal would also require a 230 KV powerline



NO. 2

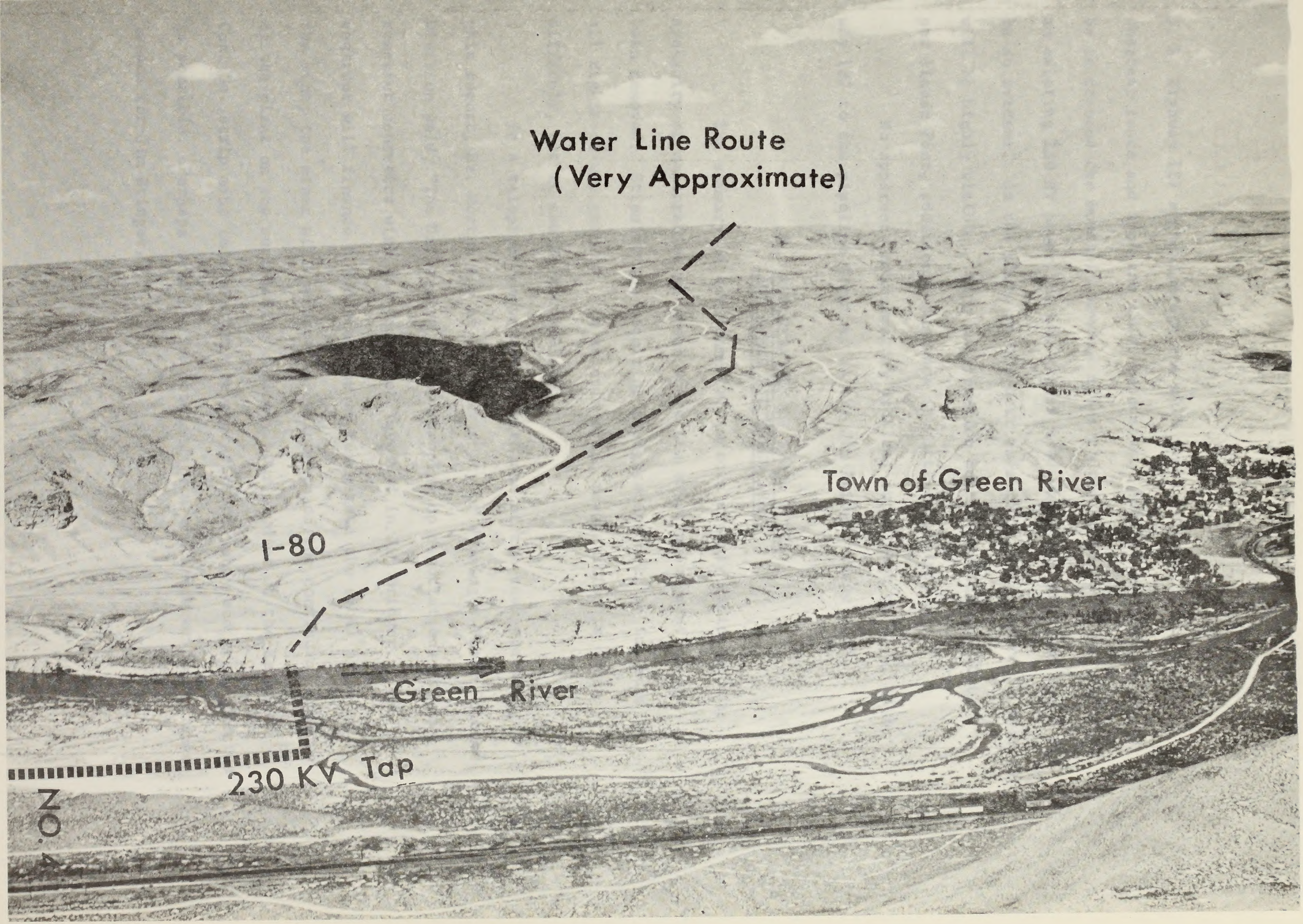
tap crossing both Interstate 80 and the Green River to power the contemplated pumping facility. The tap is necessary because there is no closer source of sufficient power to operate the pumps. See photo No. 4 on next page.

The Companies investigated the possibility of locating the pipeline and associated pumping station north of Interstate 80. The alternative site was sought to eliminate the necessity of crossing Interstate 80 and traversing high value commercial and residential lands within the Green River town limits. It was found, however, that planned future land use north of Interstate 80 along the Green River will be devoted in part to a golf course site (½ mile), and various gravel pit operations. A current study by the State of Wyoming and Bureau of Reclamation has identified a dam site in the same general area. After considering all of the data and information on hand, the power companies determined that it would be most feasible to develop the proposed site in close proximity to their present water pumping facilities.

Concerning the route from the proposed pumping station site to the Jim Bridger plant site, the following observations are made:

1. The proposed pipeline will cross and parallel, at times, the county maintained White Mountain Road. The power companies will have to take extreme caution during construction and during the period of rehabilitation to maintain and preserve the aesthetic qualities of the area bordering the road. This can be accomplished by diligent efforts to prevent erosion and to revegetate the disturbed area after construction.

2. The Companies plan to descend off the east flank of White Mountain at a point west of Rock Springs, proceeding to a crossing of


Water Line Route
(Very Approximate)
Town of Green River
I-80
Green River
230 KV Tap

NO. 4

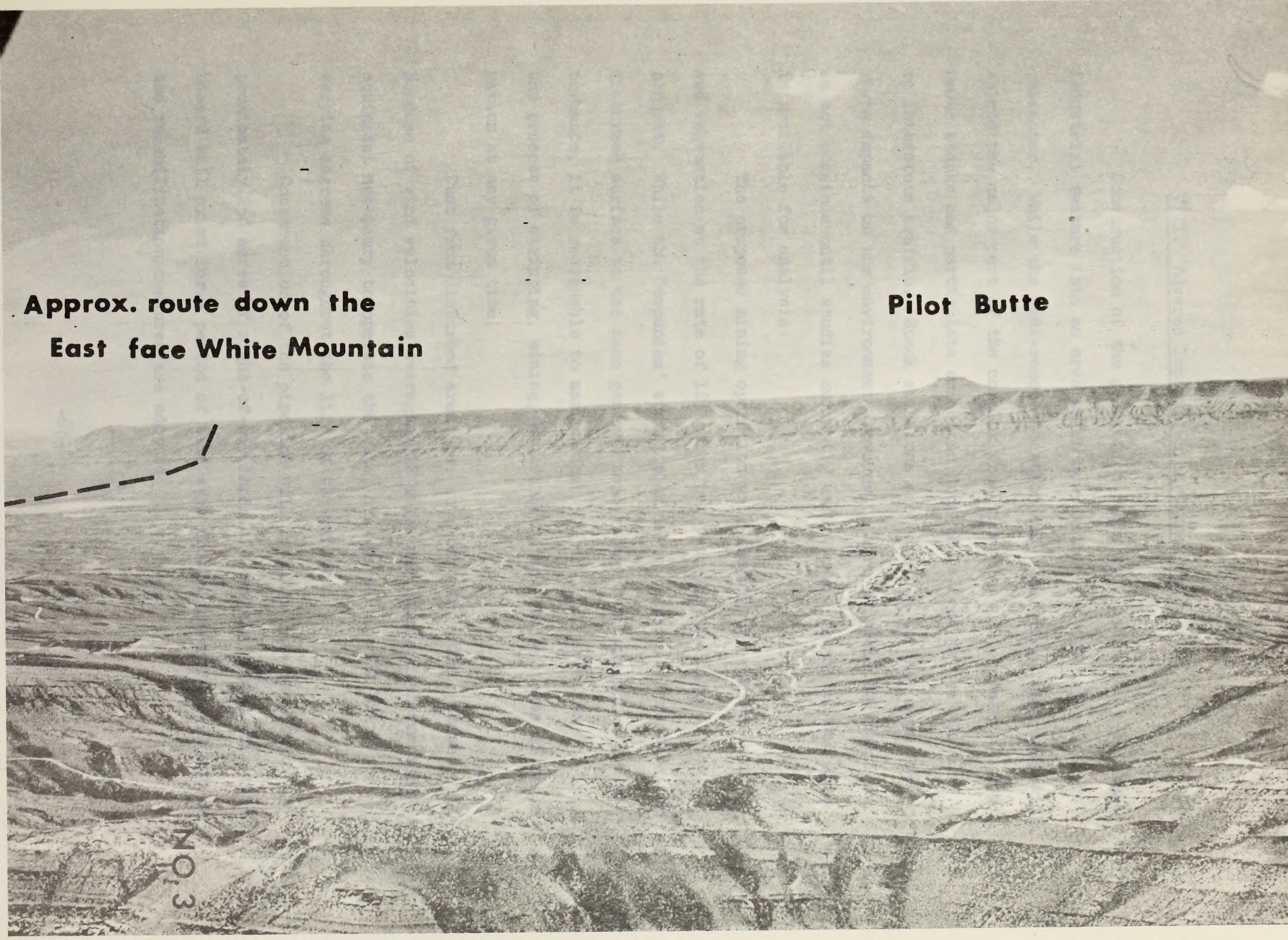
U. S. Highway 187 approximately one mile north of town. This is the shortest route and thus the least expensive. Another alternative would be to descend the mountain several miles to the north along the route of an existing 230 KV powerline and access road where the pipeline would not be so evident. As the photo on the next page indicates, any route selected will be highly visible. With construction costs approaching $50.00 per linear foot, additional distance is quite expensive.

No apparent environmental problems exist east of U. S. Highway 187 to the pipeline terminus at the Jim Bridger surge pond.

C. REVEGETATION OF SPOIL PILES AND OTHER DISTURBED AREAS

The summary of environmental impacts clearly indicates the necessity of restoration of areas where the existing vegetation has been removed. Stipulations requiring revegetation will be included in all rights-of-way granted. In an arid area, revegetation is often difficult, but it can be accomplished.

In a telephone conversation with one of the team preparing this report, Dr. Morton May of the University of Wyoming's Plant Science Division said, "The University is now wrapping up negotiations for two research contracts with the Companies involved in Jim Bridger. One contract will finance a study of how to revegetate the spoil piles at the mine; the other will sponsor an evaluation of the continuing impacts of the plant on the surrounding ecology. Our studies at the Kemmerer Coal Co. strip mine indicate that revegetation of woody and grass species is possible. Perhaps seed can be obtained from the Kemmerer source when needed for Jim Bridger."



NO. 3

VIII. Adverse Impacts Which Cannot Be Avoided

Construction of the generation plant will introduce a man-made industrial feature into an area which now exhibits an open space desert character. While the semi-remote location and undulating topography will shield the major part of the complex from view along Interstate 80, the smoke stacks and particulate emissions from the stacks may be visible to Interstate traffic. Stack emissions are expected to have some adverse impacts on the environment; however, a more accurate delineation is not possible until studies currently underway are completed and data is available for analysis.

The proposed mining operation will disturb the surface soil and vegetation at the rate of 125 acres per year for the life of the project. While the Companies' stated plan is to reclaim and restore the disturbed surface to the same general topography that existed before disturbance, it is reasonable to assume that 500 to 1,000 acres may be in the process of stripping, mining, backfilling, and early stages of reclamation at any given time.

Dust from disturbed areas is, to a certain extent, unavoidable. Because of wind velocities averaging 12 miles per hour and the mechanized equipment necessary to operate the mine, dust problems will exist in varying degrees throughout the life of the project.

Construction of the pipeline will result in disturbance of approximately 250 acres of right-of-way lands. A certain amount of erosion hazard will exist for a period of time even though intensive reclamation and rehabilitation measures are adopted.

The scenic quality of the face of White Mountain will unavoidably be impaired by a scar approximately 50 feet wide and two miles long. This face is readily observed from the Rock Springs-Green River vicinity. Duration of the impact is not easily predicted. Re-establishment of similar vegetation may screen the scar within a two to five year period. Conversely, exposure of different colored subsoils may make the disturbance a relatively permanent feature of the landscape.

Installation of the transmission lines will cause some unavoidable intrusion on the aesthetic values of the area. Since the lines pass through open range and woodlands most of their distance, points of impact to significant numbers of people are limited. The lines will cross three highways which are major routes to Yellowstone Park from the south. Combined average daily summer traffic on these three highways is approximately 3,200 vehicles per day. This impact could be avoided by use of underground cable, if and when a technique is feasible and practical. The lines will also cross the valleys of the Hams Fork and Bear Rivers. There will be some unavoidable impact to the inherent scenic quality of this area even though extensive effort at line relocation has been made to reduce visibility of the lines. The extent of this obtrusion is limited by the fact that valley orientation is north-south while the direction of line travel is primarily east-west.

IX. Short-Term Use vs. Long-Term Productivity

Most of the environmental effects are expected to be limited to the life of the power plant. These are discussed elsewhere in this report. The life of the power plant may be the 35-year life of the coal field. It could be doubled by mining deeper on lower grade deposits on the company mines, or by purchase of other deposits within economic hauling distance. On the other hand, the life of the power plant could be shortened by as much as 15 or 20 years if alternate power sources, such as nuclear, prove to be sufficiently economical and available.

Regardless of the life of the power plant, the use of the transmission line corridor probably will continue indefinitely. It has been identified as a favorable route for an extra high voltage intertie between the Pacific Northwest and the Midwest.

Possible synergistic effects are discussed in the section titled "Cumulative Impacts." However, it is not anticipated that such effects would continue more than a few years beyond the life of the power plant, with one exception. The carbon dioxide from the plant's stack emissions together with the CO_2 from other sources will remain in the atmosphere and the seas indefinitely. It is removed by natural processes but only over a period of millions of years. There is no known feasible method of speeding up the removal process.

If the power plant should operate at full capacity for 35 years, it would exhaust into the atmosphere about 450 million tons of carbon dioxide. This is about .018% of the estimated 2,333 billion

metric tons in the global atmosphere in 1950.[21] The total for the 35 years would amount to about 5% of the total global output from man's activities in one year during the 1960's. It is of significance only as a small increment in the total world output. One possible effect from cumulative increases in global CO_2 levels is discussed in section VI.A.1.

---

[21] The President's Science Advisory Committee, Report of the Environmental Pollution Panel, U. S. Government Printing Office, 1965.

X. Irreversible and Irretrievable Commitment of Resources

The generation plant is expected to consume 100 to 150 million tons of coal over the active life of the project. Sand, gravel and other construction material used in construction of the generation plant, pumping station, surge pond dam, and as surfacing material constitute a one-time use considered to be irretrievable from the practical standpoint. Almost 30,000 acre feet of water will be diverted from the Green River annually for use at the generation plant. Though lost for other downstream use or application, it is a renewable resource and is returned to the climatic and hydrologic cycle. The use of land for the generation plant and other facilities is committed to the life of the project. At such time as the facilities are abandoned, the land will again be available for other uses as conditions then dictate.

XI. Consultation and Coordination

A series of meetings have been held with representatives of Federal, State and local agencies and with other interested parties to discuss environmental aspects of the Jim Bridger complex.

The first meeting was held at Kemmerer, Wyoming on September 2, 1970, and was attended only by agency personnel from BSF&W, Bureau of Reclamation and BLM. A second meeting was held in Boise, Idaho on September 22, 1970, at which time the power companies outlined the parameters of the Jim Bridger complex for the land administering agencies. The third meeting took place on October 8 & 9, 1970, when the power companies conducted an aerial tour and on-the-ground inspection of the proposed project in Wyoming and Idaho for all interested parties in Wyoming. A similar meeting and examination of proposed facilities was conducted for Idaho people October 21 & 22, 1970. On October 27, 1970, a fifth meeting was held in Cheyenne with Company officials to discuss reclamation and rehabilitation of open pit mining operations. A sixth meeting was held in Green River, Wyoming May 20, 1971, to examine and resolve possible alternatives for crossing the Green River in the vicinity of the Seedskadee Wildlife Refuge. Idaho Public Utilities conducted a public hearing on the Jim Bridger applications at Soda Springs, Idaho on July 19, 1971. In addition, meetings have been held with several local parties to appraise them of this project.

Following is a listing of Federal, State and local agencies who were consulted or were in attendance at meetings in connection with environmental aspects of the Jim Bridger complex:

Federal Agencies

Bureau of Reclamation, Salt Lake City, Utah*

Bureau of Reclamation, Cheyenne, Wyoming

Bureau of Reclamation, Boise, Idaho

Bureau of Sport Fisheries & Wildlife, Albuquerque, New Mexico

Bureau of Sport Fisheries & Wildlife, Green River, Wyoming*

Bureau of Sport Fisheries & Wildlife, Salt Lake City, Utah

Bureau of Indian Affairs, Fort Hall Agency, Idaho

U. S. Forest Service, Logan, Utah

U. S. Forest Service, Paris & Preston, Idaho

Soil Conservation Service, Kemmerer, Wyoming

Environmental Protection Agency, Denver, Colorado*

State Agencies

Director of Aeronautics - Idaho

Idaho Department of Public Lands

Idaho State University

Idaho Public Utilities Commission

Public Service Commission - Wyoming

Department of Economic Planning & Development - Wyoming*

Air Resources Council - Wyoming

Department of Anthropology, University of Wyoming*

Highway Department - Wyoming

Wyoming Game & Fish Commission

Department of Health and Social Services - Wyoming*

State Archives & Historical Department - Wyoming

University of Wyoming

Local and Private Entities

- Idaho Power Company, Boise, Idaho
- Idaho Land & Appraisal, Boise, Idaho
- State Multiple Use Advisory Board - Idaho
- Pacific Power & Light Company, Portland, Oregon*
- Utah Power and Light Company, Salt Lake City, Utah
- Union Pacific Railroad, Omaha, Nebraska
- Uinta Development Company, Cokeville, Wyoming
- Sweetwater County Planning & Zoning Board - Wyoming*
- Lincoln County Commissioners - Wyoming
- State Multiple Use Advisory Board - Wyoming
- City of Rock Springs, Wyoming
- Town of Green River, Wyoming
- Town of Kemmerer, Wyoming
- Town of Cokeville, Wyoming
- Local School District - Rock Springs, Wyoming

*Following are copies of correspondence from these entities, which are pertinent to resolution of the environmental study.

March 3, 1849

United States Department of the Interior
BUREAU OF RECLAMATION

REGIONAL OFFICE · REGION 4
P.O. BOX 11568
SALT LAKE CITY, UTAH 84111

Routing — Initial & Date
SD
ASD
PGA
OPA
REG.
TECH. S.
MGMT. S.
LEAD RESP.

IN REPLY
REFER TO: 4-800

JUN 4 1971

To: State Director, Bureau of Land Management, State Office,
P. O. Box 1828, Cheyenne, Wyoming 82001

From: Regional Director, Salt Lake City, Utah

Subject: Environmental analysis - Jim Bridger steam electric complex

We regret the delay in replying to your May 13 letter requesting comments on the Environmental Impact Study Report, Jim Bridger Thermal-Electric Generation Project, prepared by Pacific Power & Light Company and Idaho Power Company.

Based on our experience with several Environmental Statements on thermal-electric generating stations and the comments received on them from many sources, we conclude that the data on environmental impacts (particularly on air and water) in the Environmental Impact Study Report are deficient in many respects, and that the Study Report, on the whole, does not meet the Guidelines of the Council on Environmental Quality for preparation of Environmental Statements.

We would be glad to assist in your evaluation of the Study Report, and in whatever way we can be of service in your preparation of an Environmental Statement--assuming that your agency will prepare a Statement under the provisions of Section 102(2)(C) of the National Environmental Policy Act. We suggest that your personnel responsible for this work meet with staff people in our Regional Office here to discuss the matter. Please let us know a date that will be convenient.

We enclose copies of our draft Environmental Statements on Navajo and Huntington Canyon Generating Stations which may be of interest to you. We are also including a copy of the San Juan Study of Environmental Factors.

D Crandall

Enclosures 3

Regional Director, FWS, Albuquerque, New Mexico May 20, 1971

Refuge Manager, Green River, Wyoming (RF)

Power Line Crossing of the Refuge

Today I met with Tom Rodda, Cheyenne BLM Office, Jim Binando, Rock Springs BLM Office, Wendell Smith, Idaho Power & Light Environmentalist, and Boyd Pond, Idaho Power Company engineer, to go over the proposed crossing of the Seedskadee NWR with three 345 KV transmission lines from the Jim Bridger Power Plant now under construction.

Today was the first time I had seen PP&L (Pacific Power & Light) Co.'s actual proposed route for this line although I had seen rough drawings and sketches. I think BLM people and myself convinced PP&L that some changes were needed. PP&L's planned line (shown on map) was to cut across Section 17 & 18, T22N, R109W, which is a prime waterfowl habitat development area (especially east of the river). I told them a flat no on this for the reason of esthetics and waterfowl hazards. BLM and PP&L people both agreed that this was probably a good valid reason. I hope we won't hear anymore on this route.

PP&L is definitely against crossing below Big Island because of the corrosive effects of the affluent from Stauffer Chemical Company on their lines and other equipment. So, we made an on-site inspection of the alternate route above Big Island. After going over the terrain and construction details with these people, especially their engineer, I feel that we can live with this route, and it may possibly be the best after all.

The crossing above Big Island will be just north of the bridge within 100-200 feet, and at the same level. This then will not be a waterfowl hazard since the birds will be rising to clear the bridge anyway. It will be less noticeable to people by being at low level and next to the bridge, and should be no hazard to airplanes. This crossing is also at a narrow point of the refuge not planned for waterfowl nesting developments. From the planned visitor overlook on the bluffs above Big Island the line will not be visible, nor will it be visible from the planned picnic area, etc. just southeast of the Big Island Bridge.

Construction material for the post (towers) will probably be aluminum since it is less noticeable in this country than wood posts. BLM has already recommended aluminum towers.

There are still other things (mostly between BLM & PP&L) to iron out on this planned construction, and there may be some changes yet. I will keep you posted.

Merle O. Bennett

ENVIRONMENTAL PROTECTION AGENCY
Office of Air Programs
9th Floor, Lincoln Tower, 1860 Lincoln Street
Denver, Colorado 80203

Routing		Initial & Date
	SD	
	ASD	
	PCS	
	OPA	
	RES.	
	TECH S.	
	MGMT. S.	
LEAD RESP.		

Date: July 14, 1971

Reply to Attn of:

Subject: Comments on Environmental Impact Study for Jim Bridges Project

To: Mr. Tom Rodda, Regional Planner

1. On pages 4 and 18, it is stated that emissions will conform to the Wyoming Air Quality Act. It should also be stated that operation will conform to the Federal New Source Performance Standards which will be promulgated in the fall of 1971.

2. On page 11, there is mention of design and installation of emission control facilities. There should be a statement of the degree of control to be achieved, an estimation of the emissions, and an estimation of the effects on air quality. Control techniques and stack height are usually selected by mathematical meteorological calculations, assuming specific ambient concentrations not to be exceeded. What levels are estimated to be expected to occur in the area?

3. The purposes of the Environmental Surveillance Program are not sufficiently described. How will system function? Are monitoring stations to be used in the estimation of air quality from meteorological diffusion calculations or are they being used to estimate air quality. If purpose is to estimate air quality, stations should be operated in the area of expected greatest impact of emissions. Prevailing winds are from the west. Is either sampling location (1.5 miles northwest or 10 miles east-southeast of plant site) in an area of anticipated greatest impact?

Norman A. Huey

Norman A. Huey
Assistant Regional
Air Pollution Control Director
for Technical Support

Jim Bri

THE STATE OF WYOMING

STANLEY K. HATHAWAY
Governor

Department of Economic Planning and Development

210 WEST 23RD STREET
CHEYENNE, WYOMING 82001
PHONE 777-7284

J. D. BRUNK
Executive Director

MEMORANDUM

TO: J. D. Brunk, Executive Director
FROM: John T. Goodier, Chief of Mineral Development
SUBJ: Inspection Trip - Jim Bridger Plant Site and Proposed Route for 345 KV Transmission Lines October 8-9, 1970
DATE: October 21, 1970

Mr. Claire Letson of the Bureau of Land Management invited the Department of Economic Planning and Development to take part in an inspection trip of the Pacific Power and Light and Idaho Power Companys' Jim Bridger project. The inspection trip covered the power plant site, the proposed routes for the 345 KV transmission lines, the coal mine site and the proposed route for the water line.

The inspection trip consisted of flying the entire length of the proposed route for the transmission lines and on the ground inspection of a number of areas of concern.

Areas of Concern:

1. Recreation Areas on U.S. 187 to Farson (14 mile recreation area.)

The transmission lines cross the highway 3-4 miles north of this area and are not going to be visible from this recreation site and will not have any adverse effect on this recreation site.

2. Seedskadee Project - Wildlife Refuge:

The proposed transmission line route would have crossed the Green River within the Wildlife Refuge in Section 17, T. 21 N., R. 19 W. The ideal route from the Refuge point of view would be to put the transmission line south of the Refuge. This created a problem for the power companies in that this would put the lines within 1 ½ miles of an existing trona mine operation. The power companies are concerned about corrosion of insulators from trona particles in the air.

It was proposed in the field that the transmission lines be routed across the Refuge where the Big Island Bridge crosses the

Green River in Section 26, T. 21 N., R. 109 W. This would require moving the lines approximately 6 miles south but leave them far enough north of the trona operation to eliminate the insulator corrosion problem.

If water fowl from the Refuge will fly into power lines, bridges, etc. on occasion, this route will put all the potential obstacles together and not have them spread up and down the Refuge.

This seems like a reasonable solution to this problem.

3. Highway 30 N, T. 21 N., R. 113 W:

The transmission lines parallel the highway in this area and the concern was how much of the line would be visible from the highway.

The on site inspection indicated that the transmission lines would probably not be visible from the highway or at most only one or two towers would be visible.

4. Proposed P.L. 566 Project - Hams Fork:

The on site inspection shows that the transmission lines will not cross the Hams Fork River in any reservoir areas so there is no problem with the P.L. 566 project.

5. Water Pipeline from Green River to Plant Site:

This line would cross under I 80 and follow the White Mountain Road across White Mountain and then drop down the east side of White Mountain and cross the valley north of Rock Springs.

Two changes were suggested in the water line route, which in my opinion would enhance the project.

1. As the proposed line ascends White Mountain it crosses some rock out crops that would probably leave a permanent scar. It was suggested that the line stay on the valley floor for a few hundred yards and then ascend White Mountain in an area which had no visible rock out crops and eliminate the possibility of permanent scars.

2. It was also suggested that the proposed water line route be changed at the proposed point of descent. The suggestion was for the line to stay on top of White Mountain and go north for approximately one mile before descending White Mountain and crossing the valley.

This does two things, it puts the line far enough north of Rock Springs so that any possible scars would not be readily visible and it also would reduce the amount of high pressure water line required in the original line.

3-Inspection Trip

I was very pleased with the good cooperation shown by all parties concerned and feel that Pacific Power and Light Company and Idaho Power Company are doing everything possible to protect the environment of the area.

File -
Archaeological
Survey

THE UNIVERSITY OF WYOMING
DEPARTMENT OF ANTHROPOLOGY
ARTS AND SCIENCES BUILDING
UNIVERSITY STATION, BOX 3431
LARAMIE, WYOMING 82070

October 22, 1970

RECEIVED
OCT 26 1970
JIM BRIDGER PROJECT

Mr. S. L. Campagna
Project Coordinator
Pacific Power and Light Company
Public Service Building
Portland, Oregon 97204

Dear Mr. Campagna:

I am most pleased that we will be able to conduct an archaeological survey of the Jim Bridger Project in southwest Wyoming. It is very important that archaeological surveys be conducted so that we may prevent loss of archaeological materials through construction work. There will be no problem in providing a graduate student who can conduct the survey and complete a report on his findings. It is also very likely that the same student can use the results of this survey to complete a thesis or other report that will be worthy of publication. After study and analysis of the materials found, they will be made available to you should you care to use them in some form of display or museum exhibit.

The Office of the State Archaeologist operates closely with federal agencies and the survey, once it is completed, should satisfy the Bureau of Land Management or whatever group might be concerned with regard to the materials present.

I am most anxious to see the final route of the transmission lines and we will then be able to make plans accordingly. Please feel free to ask any questions that you feel are not clear.

Sincerely,

George C. Frison
Head, Department of Anthropology

GCF:vm

cc: Mr. John Killough, BLM, Cheyenne

10/27/70 RB

bc: Hall, Frisbee, Beard, Humphreys, Arnett, Stiles, Ferguson, Hamilton, Bach

THE STATE OF WYOMING

Department of Health and Social Services

Division of Health and Medical Services

STATE OFFICE BUILDING CHEYENNE, WYOMING 82001

June 9, 1971

Routing		Initial & Date
	SD	
	ASD	
1	PCS	
	OPA	
2	RES.	Larson 9/1
	TECH S.	
	MGMT. S.	
	LEAD RESP.	/

Daniel P. Baker, State Director
Bureau of Land Management
U.S. Department of Interior
P. O. Box 1828
Cheyenne, Wyoming 82001

Dear Mr. Baker:

We have reviewed the 102 statement and April 1971 supplement submitted by PPL and Idaho Power relative to the Jim Bridger complex.

We have delayed answering your request with the hope that the EPA emission standards for stationary sources would be available. It is our present understanding that such limitations will not be published until July 29, 1971, and we cannot comment on their application to this facility until that time.

Our present program of air quality surveillance does not include comprehensive stack sampling capabilities. It would therefore be impossible to compare the Glenrock emissions with those expected from the Bridger plant except in a very academic way which may lead to erroneous conclusions. This is especially true since different correction systems are planned for the two facilities. A wet scrubbing collection system is being installed at the Glenrock 4 Unit. This device is expected to materially effect sulfur oxide emissions along with the primary function of particulate reduction.

Part II, pages 31, 32 and 33 of the 102 statement outlines the air quality surveillance plan for pre and post construction at Bridger. The summarized statement on page 37 references intended compliance with appropriate state and federal standards. We have conferred with the Companies regarding their surveillance plan and concur with its provisions. Meteorological data generated will be vital to ground level dispersion calculations under operating conditions. We further note that Part II, page 7 of the supplement and pages 22 and 24 of the 102 statement give consideration to airborne materials from construction activities, roadways, et cetera, as required by Wyoming standards.

In view of the above mentioned items and the current developments of federal and state requirements, it appears that no available means of air quality control has been ignored. We also recognize that the Companies do anticipate constructive developments in control systems as their installation progresses, and are pursuing a vigorous program to keep informed so that the best available techniques can be utilized. With this attitude and the continuing information exchanges between the Wyoming Air Resources Council and Companies we anticipate that air quality problems associated with the Glenrock and Bridger installations will be given proper consideration.

The Companies are cognizant of Wyoming's air quality requirements and the report indicates definitive actions are either in use or under review to give a favorable comparison to such standards.

Very truly yours,

Robert E. Sundin
Director
Section of Industrial Hygiene

RES:ak

PACIFIC POWER & LIGHT COMPANY
PUBLIC SERVICE BUILDING
PORTLAND, OREGON 97204

2 SD
Asst. to SD
Adm.
1 RPM
T&M
ENG.
PROG.

RPM
Route 3/29 Initial & Date
1 Chief JRK
R.A.
W.L.
2 CS
3 CL
3/29 Recreation Comm.
2850

March 24, 1971

Mr. John R. Killough, Chief
Division of Resource Program Management
United States Department of the Interior
Bureau of Land Management
State Office
P. O. Box 1828
Cheyenne, Wyoming 82001

Subject: Jim Bridger Project
Archeological and Historical
Survey

Dear John:

As suggested in your December 8, 1970 letter, we have contacted Mr. Henry Chadey, Sweetwater County Museum, regarding any historical landmarks in or around the project site that should be protected. Mr. Chadey has informed us that the Historical Society has made every effort to locate items of a historical nature in the area, and to date, they have found nothing in Section 3 (the plant site area) or at the mine area.

We will continue to work with Mr. Chadey with regard to the power transmission and water pipeline routes to determine if there is anything of historical value which should be protected.

We appreciate being informed by you of Mr. Chadey's experience of historical knowledge of the area.

Yours truly,

S. L. Campagna
S. L. Campagna
Project Coordinator

SLC:jh

cc: Mr. Henry Chadey
Sweetwater County Museum
Green River, Wyoming

285

Jim Bridger 17

WILLIS N. HEIKES

JOHN YERKOVICH
CHAIRMAN

DOMINICK S. FERRERO

COUNTY OF SWEETWATER

BOARD OF COUNTY COMMISSIONERS
GREEN RIVER, WYOMING 82935

Oct. 27, 1970

RECEIVED
OCT 28 1970
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ROCK SPRINGS, WYOMING

United States Dept. of the Interior
Bureau Of Land Management
P.O. Box 1088
Rock Springs, Wyoming 82901

Dear Sir:

At the regular meeting of the Sweetwater County Planning and Zoning Board of October 20, 1970; project numbers W-25387, W25481 and W-25413 have the approval of said board.

If further information is needed, please advise.

Yours truly,

Tex Jasperson, bv

Tex Jasperson, Chairman

TJ/bv

Route		Initial
	Dist. Mgr.	
1	Ch. Res. Mgt.	
	Re. Mgt.	
2	Lands	JB
	Forestry	
	Ch. Oper.	
	Ch. Admin.	
	Fire. Ctl	
	Rom. Ctl	
	R.S. RM	
	All Personnel	
Info.		X Action

Routing 9/14/71		Initial & Date
	SD	
	ASO	
2	PCS	[illegible]
	OPA	
1	RES.	[illegible]
	TECH S.	
	MGMT. S.	
LEAD RESP.	1	

PACIFIC POWER & LIGHT COMPANY
PUBLIC SERVICE BUILDING
PORTLAND, OREGON 97204

PHILIP G. HUMPHREYS
VICE PRESIDENT

September 14, 1971

Mr. Claire Letson, Environmental Coordinator
Bureau of Land Management
United States Department of the Interior
State Office
P. O. Box 1828
Cheyenne, Wyoming 82001

Subject: Jim Bridger Project
Coal Analysis

Dear Mr. Letson:

We recently had a telephone conversation with Gene Peterson of the Bureau of Land Management in Portland, Oregon, in which he inquired about the possible concentrations of mercury in the Jim Bridger coal. This letter is in response to that inquiry.

Although spectrochemical analysis of selected core samples indicated the absence of mercury and fluorine, we are aware that this analytical procedure is not sufficiently sophisticated to detect minute concentrations of mercury which may be significant considering the quantity of coal to be consumed in the boilers. Accordingly, we have arranged for Washington State University, College of Engineering, to analyze the Jim Bridger coal for mercury and other trace elements.

By neutron activation analysis the WSU laboratories will determine the presence and quantities, if any, of mercury and other possible trace elements. We expect to have the results of the analysis within a few weeks and will forward the results to you shortly thereafter.

Yours truly,

P G Humphreys

PGH:jh

cc: Mr. E. K. Peterson, Chief
Division of Basin Studies
U. S. Department of Interior
Portland, Oregon

EXHIBIT I

MAP OF JIM BRIDGER PROJECT

Exhibit I

JIM BRIDGER PROJECT
Transmission System

Pacific Power & Light Company
Idaho Power Company

© 1970 Richard L. Keves, Cartog/Illus. PACIFIC POWER & LIGHT COMPANY

EXPLANATION OF MATRIX SYSTEM

An approach presented in

Geological Survey Circular 645

titled

A PROCEDURE FOR EVALUATING ENVIRONMENTAL IMPACT

Appendix A

EXPLANATION OF MATRIX SYSTEM

The National Environmental Policy Act of 1969 directs that unquantified environmental amenities and values be identified and given appropriate consideration in decisionmaking along with economic and technical considerations. The Council on Environmental Quality, in furtherance of Section 102 of the Act, has set forth guidelines for the preparation of required environmental statements. To be included in the statement is "the probable impact of the proposed action on the environment."

Geological Survey Circular 645 titled "A Procedure for Evaluating Environmental Impact" presents an approach to accomplish that specific requirement by providing a system of analysis and numerical weighting of probable impacts. The approach described in Circular 645 has been adopted in this report as a systematic means of identifying the many interrelated actions proposed by the Jim Bridger Complex and evaluating their impact on the various existing characteristics of the environment.

Portions of the following discussion are quoted directly from Circular 645.

Evaluating the environmental impact of an action program or proposal is a late step in a sequence of events which result in an environmental impact statement. The environmental impact analyses require the definition of two aspects of each action which may have an impact on the environment. The first is the definition of the MAGNITUDE of the impact upon specific sectors of the environment. The term MAGNITUDE is used in the sense of degree, extensiveness, or scale. For example, highway development will alter or affect the existing drainage pattern and may thus have a large MAGNITUDE of impact on the drainage. The second is a weighting of the degree of IMPORTANCE (i.e. significance) of the particular action on the environmental factor in the specific instance under analysis. Thus the overall IMPORTANCE of impact of a highway on a particular drainage pattern may be small because the highway is very short or because it will not interfere significantly with the drainage. Depending upon the thoroughness and scope of the report inventorying existing environmental conditions, the analysis of MAGNITUDE of impact, though in some details subjective, can nevertheless be factual and unbiased. It should not include weights which express preference or bias.

The IMPORTANCE of each specific environmental impact must include consideration of the consequences of changing the particular condition on other factors in the environment. Unlike MAGNITUDE of impact, which can be more readily evaluated on the basis of facts, evaluation of the IMPORTANCE of impact generally will be based on the value judgement of the evaluator. The numerical values of MAGNITUDE and IMPORTANCE of impact reflect the best estimates of pertinence of each action.

The environmental impact assessment should consist of three basic elements:

A. A listing of effects on the environment which would be caused by the proposed development, and an estimate of the MAGNITUDE of each.
B. An evaluation of the IMPORTANCE of each of these effects.
C. The combining of MAGNITUDE and IMPORTANCE estimates in terms of a summary evaluation.

The analysis embodied above in A, B, and C is made with a matrix including on one axis the actions which cause environmental impact and on the other existing environmental conditions that might be affected. This provides a format for comprehensive review to remind the investigators of the variety of interactions that might be involved. It helps the planners to identify alternatives which might lessen impact. The number of proposed actions listed in this matrix is 100 and includes the following major categories:

A. Modification of Regime
B. Land Transformation and Construction
C. Resource Extraction
D. Processing
E. Land Alteration
F. Resource Renewal
G. Changes in Traffic
H. Waste Emplacement and Treatment
I. Chemical Treatment
J. Accidents

The vertical list of environmental characteristics contains 88 items under the following major categories and subheadings:

I. Existing Characteristics and Conditions of the Environment

A. Physical and Chemical Characteristics

1. Earth
2. Water
3. Atmosphere
4. Processes

B. Biological Conditions

1. Flora
2. Fauna

C. Cultural Factors

1. Land Use
2. Recreation
3. Aesthetics and Human Interest
4. Cultural Status
5. Man-made Facilities and Activities

D. Ecological Relationships

Together the vertical and horizontal listings give a total of 8,800 possible interactions. Within such a matrix, only a few of the interactions would be likely to involve impacts of such MAGNITUDE and IMPORTANCE that they deserve comprehensive treatment.

Although the items listed represent most of the basic actions and environmental factors likely to be involved in the full range of developments which require impact reporting, not all would apply to every project proposal.

The most efficient way to use the matrix is to check each proposed action (top horizontal list) which is likely to be involved significantly in the proposed project. Each of the actions thus checked is evaluated in terms of MAGNITUDE of effect on environmental characteristics on the vertical axis, and a slash is placed diagonally from upper right to lower left across each block which represents significant interaction.

After all boxes which represent possible impact have been marked with a diagonal line, the most important ones are evaluated individually. Within each box representing a significant interaction between an action and an environmental factor, a number from 1 to 10 is placed in the upper left-hand corner to indicate the relative MAGNITUDE of impact; 10 represents the greatest magnitude and 1, the least. In the lower right-hand corner of the box, a number from 1 to 10 is used to indicate the relative IMPORTANCE of the impact; again 10 is the greatest.

The next step is to evaluate the numbers which have been placed in the slashed boxes. At this point, it is convenient to construct a simplified or reduced matrix consisting only of those actions and environmental characteristics which have been identified as interacting. When comparing alternatives of various components of the total project, we found it convenient to identify beneficial impacts with a +, since alternate action plans may have varying degrees of both beneficial and detrimental impacts.

It must be emphasized that no two boxes on any one matrix are precisely equatable. Rather, the significance of high or low numbers for any one box only indicates the degree of impact one type of action may have on one part of the environment. If alternative actions are under consideration, and a separate matrix is prepared for each action, identical boxes in two matrices will provide a numerical comparison of the environmental impact for the alternatives considered.

Assignment of numerical weights to the MAGNITUDE and IMPORTANCE of impacts should be, to the extent possible, based on factual data rather than preference. Thus, the use of a rating scheme as used here discourages purely subjective opinion and requires the author of an environmental impact statement to attempt to quantify his judgement of probable impacts. The overall rating allows the reviewer to follow the originator's line of reasoning and will aid in identifying points

of agreement and disagreement. The matrix is, in fact, the abstract for the text of the environmental assessment.

The text of the environmental impact assessment is a discussion of individual boxes marked with the larger numerical values for MAGNITUDE and IMPORTANCE. Additionally, those columns which cause a large number of actions to be marked, regardless of their numerical value, should be discussed. Likewise, those elements of the environment which have relatively large numbers of boxes marked should be addressed.

MATRICES

AND

IMPACT ASSESSMENT

STATEMENTS

Appendix B

II PROPOSED ACTIONS WHICH MAY CAUSE ENVIRONMENTAL IMPACT

GENERATION PLANT

COUNTY ROAD

AND

RAILROAD

I EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT

				B. Land Transformation and Construction			D. Processing	G. Changes in Traffic			H. Waste Emplacement and Treatment				
				Industrial Sites & Buildings	Highways & Bridges	Railroads	Energy Generation	Railway	Automobile	Trucking	Emplacement of Tailings, Spoil & Overburden	Cooling Water Discharge	Liquid Effluent Discharge	Septic Tanks	Stack Emissions
				b	d	f	e	a	b	c	c	h	j	l	m
PHYSICAL AND CHEMICAL CHARACTERISTICS	A.	1. EARTH	IA1.a MINERAL RESOURCES				5 / 2								
			IA1.b CONSTRUCTION MATERIALS	3 / 3											
		2. WATER	IA2 SURFACE WATER QUALITY		1 / 1	1 / 1							2 / 5	1 / 5	
		3. ATMOSPHERE	IA3.a ATMOSPHERIC QUALITY								2 / 3				10 / 10
			IA3.b CLIMATE									1 / 5			1 / 10
BIOLOGICAL CONDITIONS	B.	1. FLORA	IB1.b SHRUBS	1 / 1				1 / 1	1 / 1		1 / 3		1 / 3		7 / 5
		2. FAUNA	IB2.a BIRDS					1 / 1	1 / 1	1 / 1			1 / 3		3 / 7
			IB2.b LAND ANIMALS					1 / 1	1 / 1	1 / 1			1 / 3		3 / 7
			IB2.e INSECTS												10 / 7
			IB2.f MICROFAUNA												10 / 7
CULTURAL FACTORS	C.	1. LAND USE	IC1.d GRAZING					1 / 1	1 / 1	1 / 1			1 / 5		3 / 6
			IC1.g, f&h RESIDENTIAL, COMMERCIAL AND INDUSTRIAL				3 / 3								
		3. AESTHETICS & HUMAN INTEREST	IC3.a SCENIC VIEWS AND VISTAS	2 / 2	2 / 2	2 / 2		1 / 1	1 / 1	1 / 1					5 / 8
			IC3.i HISTORICAL & ARCHEOLOGICAL	1 / 3	1 / 3	1 / 3									
		4. CULTURAL STATUS	IC4.c EMPLOYMENT				+3 / +5								
			IC4.d POPULATION DENSITY				4 / 4								
		5. MAN-MADE FACILITIES	IC5.b TRANSPORTATION NETWORK						1 / 2	1 / 2					

MATRIX NARRATIVE - GENERATION PLANT

Physical and Chemical Characteristics

Mineral Resources (IA1.a) The total resource in the coal mine will be utilized over a 30-year period, however, this amount is considered relatively small in relation to total coal reserves of the region. There may be some impact on recovery of other mineral deposits such as trona, phosphate, oil shale, etc. in the immediate area.

Construction Material (IA1.b) Sand and gravel is in limited supply along the Green River. Use in construction of this plant could prove significant in terms of total regional supply. Both magnitude and importance are accorded a rating of three.

Surface Water and Water Quality (IA2) A minor effect is expected from alteration of drainage or from surfacing and paving. The length of Deadman Wash (8 miles) to Bitter Creek renders the magnitude and importance as negligible. Surface runoff from railroads and highways will be absorbed locally. Blowdown water or liquid effluent, highly mineralized, is not intended to reach surface water drainages but would be damaging if it were to reach Bitter Creek. The same is true of the sewage treatment plant effluent. Erosion and deposition from these sources is not considered significant.

Atmospheric Quality (IA3.a) Fly ash allowed to dry out would easily be picked up by constant wind action if not covered as deposited in the coal pits. Stack emissions are considered of critical magnitude and importance because of lack of specific data on ability to clean SO_2, NO, NO_3 and particulate matter from the stacks. Maximum ratings of magnitude and importance are accorded stack emissions pending firm data on control measures.

Climate (IA3.b) Cooling water discharge will increase the relative humidity locally and is considered of minor magnitude. If under certain climatic conditions visibility is decreased on Interstate 80, the importance could be of moderate proportions. Both cooling (from particulates) and warming (from carbon dioxide) effects upon global climate resulting from fossil fuel combustion have been identified. Both effects have major long-term significance. Also regional precipitation patterns (from particulates) may be modified. The plant stack emissions will add a small increment of particulates and carbon dioxide to the regional and global totals.

Biological Conditions

Flora (IB1.b) Primary impact to shrubs, grass and microflora is expected from clearing of the plant site, railroad and highway rights-of-way. Both magnitude and importance are considered low. Failures in the bottom ash disposal system and liquid effluent disposal system, though minor in magnitude, could be moderately serious. Unknown

amounts of chemical emissions from the stacks could be of very high magnitude and importance to vegetative life.

Birds (IB2.a) Human disturbance and traffic are considered of minor magnitude and importance to upland birds. The potential discharge of effluent into water courses may be toxic to local birds and is rated of moderate importance. Stack emissions, without adequate controls, may affect microfauna and therefore the food chain of birds; consequently, a maximum magnitude rating and a very high importance rating of seven are given. Insects and microfauna (IB2.e&f) also are accorded a 3-7 rating.

Land Animals (IB2.b) Land animals are considered vulnerable to the same actions as birds and are accorded the same rating.

Cultural Patterns

Grazing (IC1.d) Railroads, auto and truck traffic will be of minor significance. Effects of liquid effluents and stack emissions are unknown but considered of moderate and high importance because of lack of definitive information.

Residential, Commercial and Industrial (IC1.f,g&h) The generation plant employment will increase the use of land for these purposes. Rapid growth without adequate planning often results in poor land use patterns. As the formal zoning or planning programs in Rock Springs, Green River, and Sweetwater County are just beginning, both magnitude and importance are given a rating of three.

Scenic Views (IC3.a) Scenic views in the general locality will be affected by the expected height of the smoke stack (500 ft.), steam generators (200 ft.), cooling towers (60 ft.), visible stack emissions and skyline outline of the complex when in close proximity to the plant. Because of the height of the stacks, a magnitude rating of five and importance of eight are assigned.

Historical and Archeological (IC3.i) The plant will obliterate any remaining vistages of the old stage and freight route from Point of Rocks to South Pass. Rerouting of the county road, which apparently was built on the stage route, around the plant is necessary. Magnitude is nil, importance is low.

Employment (IC4.c) Relative magnitude is considered low and importance is moderate as the plant will add 100 jobs to the local economy and will increase the tax base. Similarly, there will be an increased burden on regulatory and social facilities. A plus rating of magnitude three and importance five are assigned.

Population Density (IC4.d) Lack of experience in city and county planning or zoning creates a negative effect with the increased population resulting from the generation plant.

Transportation Net (IC5.b) Owing to increased traffic on Interstate 80 between Point of Rocks and Rock Springs (25 miles) by the 100 employees, the magnitude of traffic will be increased about 10%. The importance of this increase is rated slight, however, the incidence of auto accidents during rush hour traffic may warrant a much higher rating. Rerouting of County Road 4-15 around the plant complex has been accomplished to accommodate desert travel by stockmen, public land administrators and recreationists who wish to use the road north of the plant toward Steamboat Mountain and South Pass.

CAUSE ENVIRONMENTAL IMPACT

TRANSMISSION LINES

				A. Modification of Regime		B. Land Transformation and Construction		G. Changes in Traffic		J.
				c Modification of Habitat		e Roads and Trails	h Transmission Lines and Corridors	h Trails		c Operational Failure
I EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT	A. PHYSICAL CHARACTERISTICS	1. EARTH	IA4.b EROSION			4/4				
			IA4.c DEPOSITION			2/4				
	B. BIOLOGICAL CONDITIONS	1. FLORA	IB1 FLORA	2/2		1/1				
		2. FAUNA	IB2.a BIRDS	+1/+1			1/1	2/2		
			IB2.b LAND ANIMALS	+1/+1				2/4		
	C. CULTURAL FACTORS	1. LAND USE	IC1.c FORESTRY	1/1		2/2		1/1		
			IC1.d GRAZING	+1/+1		+1/+1		1/2		
			IC1.e AGRICULTURE				3/5			
			IC1.h INDUSTRIAL				+2/+3			
		2. RECREATION	IC2.a HUNTING			+1/+2				
		3. AESTHETICS AND HUMAN INTEREST	IC3.a SCENIC VIEWS AND VISTAS	1/1		5/5	6/7			
			IC3.b WILDERNESS QUALITIES			2/5	3/7	6/6		
			IC3.c OPEN SPACE				2/2			
			IC3.f PARKS AND RESERVES				1/2			
			IC3.i HISTORICAL & ARCHEOLOGICAL	1/7		3/7		5/8		
		4. CULTURAL STATUS	IC4.b HEALTH & SAFETY							1/10
			IC4.c EMPLOYMENT				+1/+1			
		5. MAN-MADE FACILITIES	IC5.c UTILITY NET				+5/+7			
	D. OTHER		FIRE PROTECTION					1/		

MATRIX NARRATIVE; TRANSMISSION LINES

Physical and Chemical Characteristics

Erosion (IA4.b) Cut and fills necessary to gain access in rough terrain for construction and maintenance crews can cause considerable erosion and are accorded a magnitude and importance rating of four. This is particularly true in the more mountainous terrain west of Kemmerer.

Deposition (IA4.c) Access road cuts and fills can cause deposition problems in the vicinity of live streams such as Hams Fork, Green River, Bear River, etc. The magnitude is considered slight because of the limited amount of cuts and fills which should be necessary, however, the importance may be of light to moderate concern.

Biological Conditions

Flora (IB1) Modification of habitat by virtue of clearing rights-of-way and construction activities is considered of slight magnitude and importance to trees on portions of the Cache National Forest, Dempsey Ridge and Rock Creek Ridge. Impact to shrubs and grasses is acknowledged, and it is considered important that tower sites and other disturbed areas be restored with vegetative cover.

Birds (IB2.a) Though of limited significance, the edge effect created by modification of habitat along right-of-way is considered a plus factor. This is offset by losses from traffic and poaching in rehabilitated R/W, and by losses from birds flying into transmission lines.

Land Animals (IB2.b) Edge effect and access corridors will offset increased human activity and poaching. Snow machines in winter big game use areas could be critical. Magnitude of traffic changes is rated two but importance is rated four because of the increased opportunities for harassment of wintering animals.

Cultural Factors

Forestry (IC1.c) Roads and trails open forested areas to heavier human activity and to man caused fires, but will make fire control access easier. Changes in traffic caused by specific routing of the lines will permit use of roads for timber sale access in the Cache National Forest.

Grazing (IC1.d) Limited amounts of new forage will result from rehabilitation of rights-of-way and may assist in livestock distribution. These benefits are partially offset by greater vulnerability of range improvements and livestock to vandalism.

Agriculture (IC1.e) The magnitude of dry farm wheat lands and irrigated farm lands traversed by transmission lines is considered moderate in relation to total miles of line. The importance of this action is rated five because of the continued inconvenience to farm equipment and operations.

Industrial (IC1.h) A magnitude rating of two and importance of three is assigned in view of the ready source of power for industrial development of the Soda Springs, Pocatello and Green River areas. There will be some indirect adverse effects unless air quality standards are adhered to..

Hunting (IC2.a) Roads and trails will effect some change in traffic patterns of wildlife and will improve hunter access to some remote areas.

Scenic Views and Vistas (IC3.a) Feathered edges and limited clearing of rights-of-way in timber will minimize effect on scenery. Roads and trails used for access and maintenance will be visible for long distances. Both the magnitude and importance is considered moderate to high. The type of tower proposed will fade from view quicker than the roads in Wyoming. The reverse is true in Idaho where the roads will be more concealed by line locations and more frequent directional changes.

Wilderness (IC3.b) The transmission route does not conflict with any wilderness or primitive area. Roads, trails and the transmission tower will have considerable impact on wilderness type qualities of some of the area. Noise from motor bikes, snowmobiles, etc. could be of greater magnitude and importance to wilderness values.

Open Space (IC3.c) Because they do not totally obstruct vision, transmission lines will not interfere greatly with open space values, but they do intrude as a man made object. Unimproved roads and trails are more or less accepted as part of the open space landscape.

Parks and Preserves (IC3.f) The Seedskadee Wildlife Refuge is the primary point of impact. The importance here will be reduced by a proposal to cross at a narrow point in the refuge and in close proximity to the Big Island Bridge.

Historical and Archeological (IC3.i) The possibility of damage from construction or roads and trails is limited; however, the destruction of any historic values has a very high importance. Fossil Buttes at Kemmerer and portions of the Oregon and Lander Cut-Off trails are in the regions traversed by the transmission line. Relocation of originally planned lines near these trails reduces the magnitude of the impact.

Health and Safety (IC4.b) The line does not pass through any dense population areas. Operational failure of the transmission line is considered of rare occurrence and of slight magnitude. The importance of a power failure to industry, employment and health and safety of the citizenry in the area affected could be critical in the rare occasion of an accident.

Employment (IC4.c) Transmission line construction is expected to have limited benefit to employment and commercial businesses in local towns along the route because of the short time employees are in one location.

Utility Net (IC5.c) The magnitude and importance of this transmission line to the total Pacific Northwest power grid is considered high and of benefit to present and future power demands.

Other (ID) Range and forest fire danger will be increased by access and travel into remote areas by a larger segment of the recreation public. Improved access will also make it easier to fight fires. The advantages and disadvantages from this viewpoint are considered offsetting.

WATER SUPPLY SYSTEM
(Includes Surge Pond, Pipeline, Intake Structure and Transmission Line)

II PROPOSED ACTIONS WHICH MAY CAUSE ENVIRONMENTAL IMPACT

I EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT

			A. Modification of Regime				B. Land Transformation and Construction						C. Resource Extraction	E. Land Alteration		G. Changes in Traffic	H. Waste Emplacement & Treatment	I. Chemical Treatment	J. Accidents
			c Modification of Habitat	d Alteration of Ground Cover	f Alteration of Drainage	m Noise and Vibration	b Industrial Sites and Buildings	e Roads and Trails	g Cables and Lifts	h Transmission Lines and Corridors	m Dams and Impoundments	r Cuts and Fills	d Fluid Removal	a Erosion Control	c Rehabilitation	b Automobile	c Emplacement of Spoil & Overburden	f Chemical Treatment of Water	b Spills and Leaks
A. PHYSICAL & CHEMICAL CHARACTERISTICS	1. EARTH	IA1.b CONSTRUCTION MATERIAL					1/1			1/2									
		IA1.c SOILS									1/1								
	2. WATER	IA2.a SURFACE WATER											1/6						
	4. PROCESSES	IA4.b & c EROSION & DEPOSITION	1/1	2/1	2/2			1/1				1/2		6/5	+1/+1	1/1	1/1		1/5
B. BIOLOGICAL CONDITIONS	1. FLORA	IB1 FLORA	1/1	4/3				1/1			2/4	1/2		1/1	+1/+2	1/1		1/1	
	2. FAUNA	IB2.a BIRDS	+2/+4					1/1		1/1									
		IB2.b & c LAND ANIMALS & FISH		+1/+1				1/1			+2/+4			+1/+1					
C. CULTURAL PATTERNS	1. LAND USE	IC1.d GRAZING	1/1					1/1			+1/+1				+1/+1	1/1			
		IC1.f & g RESIDENTIAL & COMMERCIAL								1/2									
	2. RECREATION	IC2.b FISHING									+2/+1								
		IC2.c BOATING									+2/+2								
		IC2.f PICNICKING	+4/+4								+5/+5								
	3. AESTHETICS AND HUMAN INTEREST	IC3.a SCENIC VIEWS AND VISTAS		2/6		1/2	1/2	1/1	1/5	1/1	1/1	1/5		1/2	1/1	1/1	1/5		
		IC3.d LANDSCAPE DESIGN		+2/+5							+2/+5								
		IC3.j PRESENCE OF MISFITS				1/2	1/2												
	4. CULTURAL STATUS	IC4.a CULTURAL PATTERNS				1/2	1/2												
		IC4.b HEALTH & SAFETY									1/7								
		IC4.c EMPLOYMENT					+1/+1			2/1			+1/+2						
	5. MAN-MADE									4						1			

MATRIX NARRATIVE - WATER SUPPLY SYSTEM

The water supply system includes a pumping station near the town of Green River, a 230 KV transmission line for pumping power, 42 miles of 36" pipeline carrying water from the pumping station, and the surge pond at the pipeline terminus near the generation plant. Precise information on the line location is not yet available. A general large scale map in the companies' report indicates that the route will commence at a tie from the existing 230 KV line located approximately in the middle of T. 19 N., R. 105 W., thence southwest paralleling an existing dirt truck trail to the east bank of the Green River just north of the municipal golf course area, thence southeast along the river bank through the gravel pit-construction material area, crossing Interstate 80, the Union Pacific Railroad and the river to a point approximately west of the Green River substation, thence east across the river to the proposed pumping plant.

Physical and Chemical Characteristics

Construction Material (IA1.b) There will be a one-time use of a relatively small amount of the existing sand and gravel supply from the primary source in the Green River area. The proposed transmission line route appears to traverse a major portion of the gravel pit and construction material supply. An adverse impact on the gravel pit operation of slight magnitude and importance is likely, due to the disrupting effect of the power pole location.

Soils (IA1.c) The dam and impoundment could cause a slight alkalinity increase of the soils around the edge of the impoundment area. Both magnitude and importance are considered insignificant.

Surface Water (IA2.a) Pacific Power and Light Company will utilize 35,000 of the 60,000 acre feet allocated by the State of Wyoming in Fontenelle Reservoir for industrial and municipal purposes from the Green River. This amount is 10% of the available water storage of Fontenelle Reservoir, thereby reducing water level in the reservoir during low flow periods and also reducing the amount of water for salt dilution purposes in Flaming Gorge Reservoir and in the lower Colorado River. This item was rated one and six for magnitude and importance.

Erosion (IA4.b) and Deposition (IA4.c) In the event of a break or spill of sizeable quantities of water, moderate to severe erosion would occur to the down stream drainage. Assuming the 50 ft. construction corridor for the pipeline is successfully rehabilitated immediately after installation, erosion and deposition should be of short duration. However, because of erosiveness of the raw scar and steep slopes involved, the total magnitude is considered high and importance is moderate as a result of alterations of habitat, cuts and fills, and the possibility of outdoor recreation traffic using the pipeline route. Danger of sediment deposition into live streams is nil because of the distances involved. Damage from transmission line construction, and roads and trails should be minor and largely offset by rehabilitation action.

Biological Conditions

Flora (IB1) The surge pond would inundate 80 acres which at present has a scant cover of shrubs and grass. Construction will also destroy approximately 40% of the vegetation on the pipeline right-of-way and to a lesser degree along the transmission line. The pumping station intake structure will cause some change in flow characteristics of the Green River and, therefore, the microclimate of the area of stream affected by the diversion. An infrequent occurrence of aquatic plants might be expected in the surge pond. These plants could be beneficial to the support of a fishery and water fowl population. Chemical treatment for algae control would be necessary.

Birds (IB2.a) The surge pond would provide a permanent water source for native birds of the vicinity. Because of the small amount of surface water in the area, the surge pond is considered beneficial. There may be a slight adverse impact for birds in connection with the transmission line at the point where it crosses the Green River. This would apply primarily to water fowl flyways.

Land Animals (IB2.b) and Fish (IB2.c) New habitat around the pond may provide some food for wildlife and the water impoundment would provide a permanent source of water for land animals. Improper chemical treatment of the algae could have detrimental effects on a fisheries population. The abundance of good sport fisheries in closer proximity to population centers makes this aspect of small significance. The adverse effects of habitat modification resulting from power line construction will be substantially offset by the beneficial effects of right-of-way rehabilitation, the increased edge effect and diversification of plant species along the right-of-way.

Cultural Factors

Grazing (IC1.d) Winter sheep grazing is the primary use by domestic livestock. The surge pond may provide a live water source during this period of the year. It is expected that the adverse effects from construction of the pipeline and transmission line rights-of-way will be offset by rehabilitation efforts. Adverse impacts on grazing due to increases in motorized vehicle traffic are expected to be very small because of the nature of the grazing use.

Residential (IC1.f) and Commercial (IC1.g) The pipeline traverses an area on the north outskirts of Rock Springs which is a potential residential-commercial expansion area. The straight line structure would interfere with use of the natural landscape for future development.

Fishing (IC2.b) There may be an increase in the local fishery as a result of an expected increase in aquatic life in the pools and eddies caused by the pumping station intake structure. The 80-acre surge pond may also provide a permanent source of water sufficient to support a small sport fishery. Because of existing sport fisheries in the immediate area, this item would be of small significance.

Boating (IC2.c) The pond will be large enough to provide a moderate amount of non-motorized pleasure boating. This type of boating opportunity is available in the area; therefore, the pond would be of only slight importance.

Picnicking (IC2.f) There is no present recreational use of the surge pond area. If the companies provide recreational facilities, a moderate increase in local recreational use will result. It would also be of particular benefit to the touring public if made available in connection with tours of the generation plant and coal field operations.

Scenic Views and Vistas (IC3.a) The straight line structure of the pipeline conflicts with the natural topography and landscape and would therefore have high scenic impact. It is expected that a 50 ft. construction scar will result along the entire 42-mile length of the pipeline. Due to soil and climatic conditions, revegetation and healing of the disturbed areas will be very slow and therefore a high scenic impact will result. The scar on the face of White Mountain will be visible from the towns of Green River and Rock Springs, and by travelers on Interstate 80, U. S. Highway 187 and several lesser roads. Noise of pumps and motors will be noticeable in the immediate vicinity of the pumping plant as will the building facility. Neither are considered of significant magnitude but it will be permanent in nature, hence a rating of two on importance. Adverse impacts on the aesthetic environment from the transmission line appear most likely to occur in the vicinity of the power line crossing Interstate 80. The net effect indicated is only of slight magnitude and importance because it is but one more addition to an already congested pattern of man-made features on the natural landscape.

Landscape Design (IC3.d) An 80-acre artificial lake in this semi-arid area would be a significant change to the immediate natural landscape. Being the only lake in the area, it would have a moderate beneficial effect.

Presence of Misfits (IC3.j) The pumping station facility adds to the magnitude and importance of existing improvements which are foreign to the natural river environment, i.e. railroad, substation, power lines, etc. Magnitude of one is assigned to noise vibration and building while importance is rated two.

Cultural Patterns (IC4.a) The pumping station and other facilities fit in with the existing modes of cultural and industrial development. Neither magnitude nor importance of impact is considered significant.

Health and Safety (IC4.b) The primary impact is one of danger from drowning as a result of improved fishing below the intake structure for the pumping station. Magnitude of this danger is minor, however, the importance of even a rare accident is considered high.

Employment (IC4.c) The impact from the construction phase will be temporary but beneficial. Its effect will be additive to the total project stimulation of economic growth. It will also tend to stimulate a limited degree of additional employment and increased personal income in the services sector.

Transportation Net (IC5.b) The pipeline would cross Interstate 80, the Union Pacific Railroad and potential street areas at its origin near the town of Green River. North of Rock Springs the pipeline will cross U. S. Highway 187 and spurlines of the U. P. Railroad. Near Thayer Junction the pipeline would cross the surfaced road and the Railroad spurline leading to the mines near Superior. In addition, the pipeline would cross several lesser roads. It is expected that the existing transportation system would incur some temporary disruption during the construction phase. The water supply system facilities would cause very little increased use of the present transportation system.

II PROPOSED ACTIONS WHICH MAY CAUSE ENVIRONMENTAL IMPACT

COAL MINES

I EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT			B. Land Transformation and Construction		C. Resource Extraction		E. Land Alteration		H. Waste Emplacement	
			Industrial Sites	Highways & Bridges	Blasting & Drilling	Surface Excavation	Strip Mining Rehabilitation		Liquid Effluent Discharge	
A. PHYSICAL AND CHEMICAL CHARACTERISTICS	1. EARTH	IA1.c SOILS				2/1	+1/+1			
	2. WATER	IA2.a SURFACE WATER QUALITY				1/1			1/3	
	3. ATMOSPHERE	IA3.a QUALITY				2/4	1/2			
	4. PROCESSES	IA4.g STABILITY		1/1		1/1	+1/+1		2/1	
B. BIOLOGICAL CONDITIONS	1. FLORA	IB1.b SHRUBS				2/2	1/1			
		IB1.c GRASS				2/2	+1/+1			
	2. FAUNA	IB2.a BIRDS	1/1	2/1	2/1	3/1	+3/+1			
		IB2.b LAND ANIMALS	1/1	2/1	2/1	3/1	+3/+1			
C. CULTURAL FACTORS	1. LAND USE	IC1.d GRAZING	1/1	1/1		1/1	+2/+3			
	2. RECREATION	IC2.a HUNTING	1/1			2/4				
	3. AESTHETICS AND HUMAN INTEREST	IC3.a SCENIC VIEWS AND VISTAS	1/1	1/1		2/1	1/2			
		IC3.b WILDERNESS QUALITIES	1/1	1/1		2/1	1/2			
		IC3.c OPEN SPACE QUALITIES	1/1	1/1		2/1	1/2			
	4. CULTURAL STATUS	IC4.a CULTURAL PATTERNS				+1/+2				
		IC4.c EMPLOYMENT				+3/+5				
	5. MAN-MADE FACILITIES & ACTIVITIES	IC5.g INTERPRETIVE-EDUCATIONAL				+2/+4				

MATRIX NARRATIVE - COAL MINE

Physical and Chemical Characteristics

Soils (IA1.c) Surface excavation will destroy the soil profile in the mined area at the estimated rate of 125 acres per year. Restructuring of the soil profile can be hastened by application of modern rehabilitation techniques.

Surface Water (IA2.a) Surface water could be affected by the surface excavation and discharge of effluent water occurring in the mine pits. Plans call for the excavation to parallel Nine Mile Wash, an ephemeral stream. The likelihood of mine effluent reaching Bitter Creek was considered small, the importance of contamination from this source was rated low.

Atmospheric Quality (IA3.a) The removal of overburden in the mining operations could add considerable dust to the air. Until revegetated, the spoil banks would be a source of windblown material. Because of the relatively small area being denuded annually and assuming the haul roads will be surfaced in order to support the proposed 120-ton dump trucks, both magnitude and importance were given light to moderate ratings.

4.g) Erosion, deposition and slides are expected
and importance -- limited to the spoil banks which
re known techniques for rehabilitation are practical.
ent would be a major causative agent. The low
mbined with the length of Deadman Wash provides
transportation and deposition of sediments into

) and Grasses (IB1.c) The disturbance of native
only on the area being excavated or used for
1. Since disturbance will be gradual over the life
ilitation is considered a mandatory aspect of the
e and importance of the impact are considered low.

and Land Animals (IB2.b) Upland birds and land
ea of activity as habitat and will no doubt avoid
mine operations. Human activity associated with
s, blasting and drilling, and surface excavation
sident wildlife. Rehabilitation of the mined area
factor. Antelope and similar animals tend to
nt type" activity and are not adversely affected

The magnitude of forage lost for grazing is
small area affected by buildings, excavation
rtance is not considered significant because

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MATRIX NARRATIVE - COAL MINE

Physical and Chemical Characteristics

Soils (IA1.c) Surface excavation will destroy the soil profile in the mined area at the estimated rate of 125 acres per year. Restructuring of the soil profile can be hastened by application of modern rehabilitation techniques.

Surface Water (IA2.a) Surface water could be affected by the surface excavation and discharge of effluent water occurring in the mine pits. Plans call for the excavation to parallel Nine Mile Wash, an ephemeral stream. The likelihood of mine effluent reaching Bitter Creek was considered small, the importance of contamination from this source was rated low.

Atmospheric Quality (IA3.a) The removal of overburden in the mining operations could add considerable dust to the air. Until revegetated, the spoil banks would be a source of windblown material. Because of the relatively small area being denuded annually and assuming the haul roads will be surfaced in order to support the proposed 120-ton dump trucks, both magnitude and importance were given light to moderate ratings.

Stability (IA4.g) Erosion, deposition and slides are expected to be of low magnitude and importance -- limited to the spoil banks which require some aging before known techniques for rehabilitation are practical. Discharge of mine effluent would be a major causative agent. The low rainfall of the area combined with the length of Deadman Wash provides opportunity to prevent transportation and deposition of sediments into Bitter Creek.

Biological Conditions

Shrubs (IB1.b) and Grasses (IB1.c) The disturbance of native vegetation is important only on the area being excavated or used for deposition of overburden. Since disturbance will be gradual over the life of the project and rehabilitation is considered a mandatory aspect of the operation, both magnitude and importance of the impact are considered low.

Birds (IB2.a) and Land Animals (IB2.b) Upland birds and land animals will lose the area of activity as habitat and will no doubt avoid a peripheral area of the mine operations. Human activity associated with mine building, haul roads, blasting and drilling, and surface excavation will adversely affect resident wildlife. Rehabilitation of the mined area is expected to be a plus factor. Antelope and similar animals tend to become accustomed to "plant type" activity and are not adversely affected unless harassed.

Cultural Factors

Grazing (IC1.d) The magnitude of forage lost for grazing is relative light due to the small area affected by buildings, excavation and haul roads. The importance is not considered significant because

of the very low carrying capacity. Rehabilitation of the spoil banks, if successful, will eventually restore the forage; however, it will be a slow process.

Hunting (IC2.a) The impact on hunting will be minimal in terms of area affected but moderately important if safety of mine employees is to be secure. Not only the immediate area of activity but a peripheral area should be closed to use of firearms. Archery hunting could be permitted.

Scenic Views (IC3.a) and Wilderness (IC3.b) Buildings, haul roads and spoil banks will have limited impact on the scenic views of wilderness and open space. That of surface excavation will be greater.

Cultural (IC4.a) Culturally the mining operation is considered a plus factor in this area, as it is not contrary to the existing life pattern of the region which developed on an economy of mining and livestock grazing.

Employment (IC4.c) The impact will be moderate in magnitude and importance to Point of Rocks townsite and the city of Rock Springs where employees at the mine are expected to reside and transact much of their daily business. The payroll will be a welcome economic boost to those towns which experienced some economic decline after the close of the Union Pacific coal mines several years ago.

Interpretive Educational (IC5g) The coal mine complex and other facilities presents an opportunity for interpretive and educational benefit, should the company choose to provide self-conducted or guided tours of the coal mine and generation plant. Located within ten miles of Interstate 80 which is a primary east-west tourist route, the mining operation might well prove to be an interesting and educational attraction for hundreds of motorists.

Preliminary Analysis of Meteorological Conditions at the Jim Bridger Plant Site

An independent analysis and predictive
model prepared by the Bureau of Reclamation
working with the Tennessee Valley Authority

Appendix C

Meteorological Studies

Dispersal of the stack emissions attendant to thermal-electric power generation depends largely on the motions of the atmosphere at and downwind from the plantsite. The direction and intensity of these motions are subject to considerable variation. Migratory largescale pressure systems combine with local terrain effects and the daily cycle of solar radiation to provide a wide range of dispersal conditions. Prediction of surface concentrations of stack emissions requires detailed meteorological inputs. The vertical temperature distribution and winds at the surface and aloft are important considerations. While much useful information can be inferred from general knowledge of the behavior of the atmosphere, and analyses of long-term observations taken at stations in the same geographic region, there is no completely valid substitute for extensive meteorological observations taken in the immediate vicinity of the plant site.

Analysis of dispersal conditions at the Jim Bridger Thermal-Electric Generation Project benefits from long-term upper air observations taken by the National Weather Service at Grand Junction, Colorado, and Lander, Wyoming, and from surface observations taken at airports serving nearby Rock Springs, Wyoming. Valuable as these data are, they need to be calibrated against observations made at the actual project site. In recognition of this fact, Idaho Power Company and Pacific Power and Light Company engaged Western Scientific Services, Inc. (WSSI) to study the site meteorology.

On-Site Meteorological Program

The agreement between the Companies and WSSI provided for the erection of a 200-foot high tower with continuous recording of wind speed and direction, temperature, and dewpoint at the 200-foot, 100-foot, and 20-foot levels, as well as a recording solar radiometer.

The contract also required a series of 10 two-week studies every two months to describe the vertical variation in wind speed and direction, the influence of local terrain on airflow over the plantsite, and the characteristics of the diurnal surface inversion as related to the depth of the mixing layer. Studies have been conducted during September 10 through 27, 1970; November 3 through 11, 1970; February 16 through 24, 1971; April 8 through 13, 1971; and June 19 through 24, 1971. A total of 40 days of detailed observations have been accumulated.

Data collected included surface meteorological observations, serial pilot balloon observations to describe the vertical wind structure, and serial constant volume balloon observations to describe air parcel trajectories for selected meteorological regimes. Vertical temperature structure is determined by flying a specially-equipped light aircraft from 300 feet above the ground to 10,000 feet in a tight spiral over the plantsite.

Results to Date

A preliminary analysis of the meteorological observations has been made for the purpose of this statement. A more complete analysis will be presented to the Companies in late 1972.

The wind velocity and direction at the surface near the Jim Bridger site corresponds with the flow pattern depicted on standard weather maps primarily during daylight hours, but can occur at any time when the large-scale weather features are sufficiently strong to control the airflow throughout a well-mixed layer extending from the surface of the earth upward for several thousand feet.

When the earth cools off at night, a layer of cool, stable air may develop near the earth's surface. Within this layer, the wind velocity is much lower and the direction can vary considerably from that found above the stable air. At the plantsite, this stable air layer occurs nightly except when strong winds associated with major weather features are present. The stable layer forms about sunset when surface cooling begins and slowly deepens during the night. Breakup of the stable layer depends upon the depth of the layer and the amount of surface heating. Breakup is very rapid, but if surface winds are light and a cloud cover prevents surface heating, the stable layer can persist throughout the day.

The stable layer averages about 600 feet in depth. When a high pressure system dominates the area and the light winds and clear skies characteristic of such systems allow strong radiation cooling, a stable layer as much as 1,600 feet deep can form. This happens about 3 percent of the time.

Very unstable or moderately unstable weather conditions rarely occur at the Jim Bridger plantsite. Very stable conditions also rarely occur. Slightly unstable conditions occur essentially only in the daylight hours. Neutral stability occurs during the day when the air is

well-mixed and at night when the lack of surface heating prevents vertical mixing. Slightly stable conditions exist during the night, but can persist throughout the day when low clouds and small temperature changes prevent vertical mixing. The absence of a wide, deep valley and the location of the site near the Continental Divide prevents long periods of deep air stagnation.

About 45 percent of the time, wind velocity at the site is between 10 and 20 miles per hour. Only 10 percent of the time is the wind less than five or greater than 20 miles per hour.

Meteorological regimes commonly persist for no more than about six hours. Less than two percent of the time do conditions persist for more than 12 hours. The longest periods of persistence are associated with northeasterly winds.

During the warmer months of the year, the dominant direction of airflow is from the southwest. During the winter months with slightly unstable conditions, winds are about equally divided between southwest and west. During slightly stable conditions, most of the flow is from the southwest, but southeast and northwest flows are not uncommon. Intense storm centers moving from west to east across Colorado cause northeast airflows which can persist for as long as 30 hours.

Fumigation conditions are most likely when a rapid change from slightly stable to slightly unstable conditions when rapid vertical mixing from surface heating occurs. Since slightly unstable conditions are found only about 12 percent of the time, and then predominantly during the summer months, fumigation is not expected to be frequent in the vicinity of the Jim Bridger plantsite.

At the request of the Bureau of Land Management, air quality experts of the Tennessee Valley Authority made modeling studies of diffusion to be expected near the site. Their estimates are shown in the following tables.

Table 1

ESTIMATED MAXIMUM 1-HOUR AVERAGE CONSTITUENT SURFACE CONCENTRATION

JIM BRIDGER GENERATING STATION*

3-Unit (1,500-mw) Operation

Three 500-Foot Stacks

East Sector

		Dispersion Model**								
		Coning			Inversion Breakup			Trapping		
	Constituent Emission Rate	Concentration		Dist.	Concentration		Dist.	Concentration		Dist.
Constituent	(tons/unit/day)	(ppm)	($\mu g/m^3$)	(mi.)	(ppm)	($\mu g/m^3$)	(mi.)	(ppm)	($\mu g/m^3$)	(mi.)
SO_2	94.5	0.25	542	2.0	0.30	651	4.7	0.33	716	2.0
NO_x	49.7	0.18	281	2.0	0.22	343	4.7	0.24	374	2.0
CO_2	12,900	50	74,604	2.0	60	89,525	4.7	66	98,478	2.0
H_2O	3,800	36	21,988	2.0	43	26,264	4.7	47	28,707	2.0
Particulates	4.3		24.5	2.0		29.5	4.7		32.0	

---

*Based on representative station pressure and temperature, 590 mm and 42.7° F.

**Difference in terrain elevation considered in calculations.

Table 2

ESTIMATED MAXIMUM 1-HOUR AVERAGE CONSTITUENT SURFACE CONCENTRATION

JIM BRIDGER GENERATING STATION*

3-Unit (1,500-mw) Operation

Three 500-Foot Stacks

WSW Sector

Constituent	Constituent Emission Rate (tons/unit/day)	Dispersion Model**								
		Coning			Inversion Breakup			Trapping		
		Concentration		Dist.	Concentration		Dist.	Concentration		Dist.
		(ppm)	(μg/m^3)	(mi.)	(ppm)	(ug/m^3)	(mi.)	(ppm)	(μg/m^3)	(mi.)
SO_2	94.5	.16	347	3.0	0.29	629	4.8	0.32	694	2.0
NO_x	49.7	.12	187	3.0	0.21	328	4.8	0.23	359	2.0
CO_2	12,900	32	47,747	3.0	58	86,541	4.8	64	95,494	2.0
H_2O	3,800	23	14,048	3.0	41	25,042	4.8	46	28,096	2.0
Particulates	4.3		15	3.0		28.2	4.8		31.7	2.0

---

*Based on representative station pressure and temperature, 590 mm and 42.7° F.
**Difference in terrain elevation considered in calculations.

Table 3

ESTIMATED MAXIMUM 1-HOUR AVERAGE CONSTITUENT SURFACE CONCENTRATION

JIM BRIDGER GENERATING STATION*

3-Unit (1,500-mw) Operation

Three 500-Foot Stacks

SE Sector

Constituent	Constituent Emission Rate (tons/unit/day)	Dispersion Model**								
		Coning			Inversion Breakup			Trapping		
		Concentration (ppm)	Concentration (μg/m³)	Dist. (mi.)	Concentration (ppm)	Concentration (μg/m³)	Dist. (mi.)	Concentration (ppm)	Concentration (μg/m³)	Dist. (mi.)
SO_2	94.5	0.10	217	3.0	0.19	412	8.8	0.23	499	2.0
NO_x	49.7	0.07	109	3.0	0.14	218	8.8	0.17	265	2.0
CO_2	12,900	20	29,842	3.0	38	56,699	8.8	34	50,731	2.0
H_2O	3,800	14	8,551	3.0	27	16,491	8.8	33	20,156	2.0
Particulates	4.3		9	3.0		18.6	8.8		22.5	2.0

*Based on representative station pressure and temperature, 590 mm and 42.7° F.

**Difference in terrain elevation considered in calculations.

Table 4

ESTIMATED MAXIMUM 1-HOUR AVERAGE CONSTITUENT SURFACE CONCENTRATION

JIM BRIDGER GENERATING STATION*

3-Unit (1,500-mw) Operation

Three 500-Foot Stacks

NNW Sector

		Dispersion Model**								
	Constituent Emission Rate	Coning			Inversion Breakup			Trapping		
		Concentration		Dist.	Concentration		Dist.	Concentration		Dist.
Constituent	(tons/unit/day)	(ppm)	(ug/m³)	(mi.)	(ppm)	(ug.m³)	(mi.)	(ppm)	(μg/m³)	(mi.)
SO_2	94.5	0.14	304	5.0	0.21	456	7.9	0.24	521	2.0
NO_x	49.7	0.10	156	5.0	.15	234	7.9	.18	281	2.0
CO_2	12,900	28	41,778	5.0	42	62,668	7.9	48	71,620	2.0
H_2O	3,800	20	12,216	5.0	30	18,324	7.9	34	20,767	2.0
Particulates	4.3		14	5.0		20.7	7.9		23.5	2.0

*Based on representative station pressure and temperature, 590 mm and 42.7° F.
**Difference in terrain elevation considered in calculations.

Ground Level Concentrations
for
Sulfur Dioxide, Particulates and Nitrogen Oxides

A preliminary letter-type report

from the Owners' Consultant

Appendix D

W. L. FAITH
2540 HUNTINGTON DRIVE
SAN MARINO, CALIF. 91108

CONSULTING CHEMICAL ENGINEER

213-287-9383

RECEIVED
SEP 10 1971
JIM BRIDGER PROJECT

September 7,1971

Mr. S.L. Campagna
Pacific Power and Light Co.
Public Service Building
Portland, Oregon 97204

Dear Mr. Campagna:

I have examined the data submitted to me re the proposed Jim Bridger generating plant of Pacific Power and Light Co. and Idaho Power Company.

On the basis of plant design and operating data, the meteorological conditions at the site as determined by Western Scientific Services, Inc., and applicable calculations for dispersion of the stack gas plumes, I have reached the following conclusions:

1. The ultimate plant with three 500 megawatt (MW) units will require three 500-ft. stacks in order to meet applicable air quality standards for suspended particulate matter, sulfur dioxide, and nitrogen oxides; and to prevent downwash in the wake of the boiler plant.

2. The limiting pollutant, that is, the one which requires the highest stack for suitable dispersion, is sulfur dioxide.

3. Based on three 500-ft. stacks, the maximum ground-level concentrations of sulfur dioxide (compared with applicable air quality standards) are:

Max. glc	Wyoming standards	
390 ug/m^3 - 3 hours	None. Fed. is 1300 ug/m^3	- 3 hr. max.
103 ug/m^3 - 24 hours	0.10 ppm (260 ug/m^3)	- 24 hr. max.
13 ug/m^3 - annual	0.02 ppm (52 ug/m^3)	- annual mea

These values are based on use of coal core sample No. 125 which sample contains the maximum amount of total sulfur (0.77 per cent) of all coal core samples in the field.

Mr. S.L. Campagna
Page 2
Sept. 7,1971

When coal of minimum total sulfur content (sample No. 236) is burned, the maximum glc's for SO_2 will be only 47% of those listed.

4. The calculated maximum glc for particulate matter assuming use of 99.33 percent efficient electrostatic precipitator for coal with maximum and minimum ash content (11.3% ash as received - Sample No. 225FC) and (7.3% ash as received - Sample No. 115) are:

Sample 225FC (11.3%ash)	Sample 115 (7.3% ash)
4.0 ug/m^3/24 hours	2.4 ug/m^3/24 hours
<1.0 ug/m^3 (annual)	<1.0 ug/m^3 (annual)

These values are far below the Wyoming ambient air quality standards of 200 ug/m^3 max. for 24 hours and 75 ug/m^3 annual mean.

5. The calculated maximum glc for oxides of nitrogen, as compared with Wyoming and Federal standards are:

Max. glc NO_x	Wyoming standard
0.12 ppm - 1 hour	0.15 ppm - 1 hour (Max.)
5.7 ug/m^3 -annual	None. Fed. is 100 ug/m^3 annual mean

On the basis of the above I recommend that the stacks at the Jim Bridger generating station be 500 ft. high. This is twice the height of the boilers. With an effluent velocity in excess of 70 ft. per second, downwash in high winds will be forestalled.

Attached to this letter is a list of the basic plant design and operating data used in the dispersion calculations, and also a description of the dispersion model used.

A complete report of the stack height study is in preparation.

Sincerely yours,

W L Faith

W.L. Faith

PLANT DESIGN AND OPERATING DATA
JIM BRIDGER PLANT

1. Plant size (3 units)	-500 megawatts each
2. Heat input	- $5.02\text{x}10^9$ Btu/hr
3. Stack gas exit temperature	- 240°F
4. Coal consumption as related to ash content	
Max. (225 FC)	- $554\text{x}10^3$ lbs per hour
Min. (115)	- $508\text{x}10^3$ lbs per hour
5. Stack gas flow (max)	- $2.11\text{x}10^6$ cfm/unit
	- $5.43\text{x}10^6$ lb/hr/unit
6. Sulfur content of coal	
Max. (Core sample 125)	- 0.77% (as recd.)
Min. (Core sample 236)	- 0.36% (as recd.)
7. Fly ash entering collection equip.	- 80% of ash input
Max. $(0.8\text{x}554\text{x}10^3\text{x}0.113)$ (Core 225FC)	$-50.2\text{x}10^3$ lb/hr/unit
Min. $(0.8\text{x}508\text{x}10^3\text{x}0.073)$ (Core 115)	$-29.5\text{x}10^3$ lb/hr/unit
8. Total sulfur imput	
Max. $509\text{x}10^3\text{x}.0077$	- 3920 lb/hr/unit
Min. $506\text{x}10^3\text{x}.0036$	- 1820 lb/hr/unit
9. SO_2 emissions	
Max.	- 7840 lb/hr/unit
Min.	- 3640 lb/hr/unit
10. Particulate emissions	
Max. $50.2\text{x}10^3\text{x}.0067$ (Core 225FC)	- 325 lb/hr/unit
Min. $29.5\text{x}10^3\text{x}.0067$ (Core 115)	- 197 lb/hr/unit
11. Stack diameter	- 24 ft.
12. Stack gas exit velocity	- 77.5 fps
13. NO_x emission (Calculated as NO_2)	3900#/hr/Unit

ATMOSPHERIC DISPERSION MODEL

Relative maximum concentration/unit emission ratios (X/Q) were calculated for a range of wind velocities (1 - 15 m/sec) and atmospheric stabilities (Pasquill A to F) up to downwind distances of 40 miles using the NUS Corporation's CONCAP computer program. X/Q concentrations for one unit and for two units were made and the summed concentrations from all three units were obtained.

The CONCAP computer program uses the Briggs formula for determining plume rise, and Hillsmeier-Gifford standard horizontal and vertical deviations of the plume.

Gaussian distribution is assumed except where inversion or mixing height interferes, in which case uniform mixing in the vertical plane is assumed at a proper distance from the stack.

Both long-term and short-term glc's are calculated, with and without inversions. The equations used are:

Long term glc.
(no inversion)

$$\frac{X}{Q} = \frac{2.03}{\sigma_z u x} \cdot e^{-1/2 \left(\frac{H}{\sigma z}\right)^2}$$

Long term glc
(with inversion

$$\frac{X}{Q} = \frac{2.55}{L u x}$$

Short term glc
(no inversion)

$$\frac{X}{Q} = \frac{1}{\pi \sigma y \sigma z u} \cdot e^{-1/2 \left(\frac{H}{\sigma z}\right)^2}$$

Short term glc
(with inversion)

$$\frac{X}{Q} = \frac{1}{(2\pi)^{1/2} \sigma y L u}$$

where,

X = concentration (g/m^3)

Q = emission rate of pollutant (g/sec)

σy = the standard deviation in the crosswind direction of the plume concentration distribution (m)

σz = the standard deviation in the vertical of the plume concentration distribution (m)

u= wind speed (m/sec)

x = distance downwind in the direction of the mean wind

$\pi = 3.1416$

$e = 2.718$

$H = H_s + \Delta h$ = effective stack height (m)

H_s = actual stack height (m)

Δh = plume rise calculated by Briggs formula (q.v.) (m)

L = mixing height (m)

Short-term glc values are for 10-minutes. These may be multiplied b 0.74 to yield hourly values.

Long-term X/Q is used in connection with meteorological data for periods of a day, a month, or a year to yield glc values for the period of interest.

When X/Q values are multiplied by emission rates in g/sec x 10^6, the resulting value is the glc expressed as micrograms per cubic meter.

Conversion factors used to convert $\mu g/m^3$ to ppm are:

For sulfur dioxide:

$\mu g/m^3 \times 3.82 \times 10^{-4}$ = ppm SO_2

For nitrogen oxides (as NO_2)

$\mu g/m^3 \times 5.319 \times 10^{-4}$ = ppm NO_x (as NO_2)

BRIGGS PLUME RISE EQUATION
(for neutral and unstable atmospheres)

$$\Delta h = 1.6 F^{1/3} u^{-1} x^{2/3} \qquad (x < 10h_s)$$

$$\Delta h = 1.6 F^{1/3} u^{-1} (10h_s)^{2/3} \qquad (x > 10h_s)$$

where,

$F = \frac{g\, Q_h}{\pi C_p \rho T}$ = buoyancy flux

and where new symbols are:

g = gravity acceleration = 9.83 m/sec/sec

Q_h = heat emission in stack gases (cal/sec)

C_p = specific heat of air at constant pressure

ρ = average density of ambient air

T = average absolute temperature of ambient air

(for stable atmosphere)

$$\Delta h = 2.9 \left(\frac{F}{u\, s}\right)^{1/3}$$

where,

s = stability parameter = $\frac{g}{T} \cdot \frac{\partial \theta}{\partial z}$

where $\frac{\partial \theta}{\partial z}$ = vertical potential temperature gradient = 0.9°C/100m

LIST OF REFERENCES

U. S. Department of Agriculture, Forest Service, Bitterroot National Forest.
Management Proposal for the Magruder Corridor, Including Environmental Statement in Accordance with Sec. 102(2)(c) of P.L. 91-190. Hamilton, Montana: November 1, 1970.

Upper Colorado Region State-Federal Inter-Agency Group, Land Use and Management Work Group.
Land Resources and Use, Appendix VI, Upper Colorado Region Comprehensive Framework Study. (Preliminary Field Draft.) November 1970.

Pacific Northwest River Basins Commission, Columbia-North Pacific Technical Staff.
Land Measures and Watershed Protection, Appendix VIII, Volume 1, Columbia-North Pacific Region Comprehensive Framework Study. (Preliminary Draft.) Vancouver, Washington: October 1969.

Great Basin Region State-Federal Inter-Agency Group, Land Resources and Use Work Group.
Land Resources and Use, Appendix VI, Great Basin Region Comprehensive Framework Study. (Preliminary Field Draft.) November 1970.

Upper Colorado Region State-Federal Inter-Agency Group, Economic Base and Projections Work Group.
Economic Base Projections, Appendix IV, Upper Colorado Region Comprehensive Framework Study. (First Draft.) September 1969.

Upper Colorado Region State-Federal Inter-Agency Group, Water Resources Work Group.
Water Resources, Appendix V, Upper Colorado Region Comprehensive Framework Study. (Preliminary Field Draft.) November 1970.

Department of the Interior, Bureau of Land Management.
The Impact of Power Transmission Lines and *Their Effect on the Southwest Environment*. September 1970.

U. S. Department of the Interior, Geological Survey.
A Procedure for Evaluating Environmental Impact.
(By L. B. Leopold and F. E. Clark.) Geological Survey Circular 645.
GPO: 1971.

Pacific Power and Light Company and Idaho Power Company.
Environmental Impact Study Report: Jim Bridger Thermal-Electric Generation Project. December 1970.

Environmental Impact Study Report: Jim Bridger Thermal-Electric Generation Project. Supplement. April 1971.

Environmental Impact Study Report: Jim Bridger Thermal-Electric Generation Project. Supplement No. 2. July 1971.

Wyoming, State.
Minutes of the State of Wyoming Electric Power Conference, April 16-17, 1970. 1970.

Wyoming, Department of Economic Planning and Development.
1st Annual Report - 1969. No date cited.

Wyoming, University, College of Commerce and Industry, Division of Business and Economic Research.
Wyoming Data Book - 1967. April 1968.

Department of the Interior, Bureau of Reclamation.
Draft of Environmental Statement - Navajo Project. January 1971.

Draft of Environmental Statement - Huntington Canyon Generating Station and Transmission Line.
Salt Lake City: March 1971.

Environmental Statement - Navajo Project. (Preliminary Draft.)
September 1970.

Pacific Southwest Inter-Agency Committee.
Mineral Resources, Appendix VII, Great Basin Region Comprehensive Framework Study. (Preliminary Field Draft.) July 1970.

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